2007

Assisted Reproductive Technology Success Rates

National Summary and Fertility Clinic Reports

Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion
Division of Reproductive Health
Atlanta, Georgia

American Society for Reproductive Medicine
Society for Assisted Reproductive Technology
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Preface

For many people who want to start a family, the dream of having a child is not easily realized; about 12% of women of childbearing age in the United States have used an infertility service. Assisted reproductive technology (ART) has been used in the United States since 1981 to help women become pregnant, most commonly through the transfer of fertilized human eggs into a woman's uterus. However, for many people, deciding whether to undergo this expensive and time-consuming treatment can be difficult.

The goal of this report is to help potential ART users make informed decisions about ART by providing some of the information needed to answer the following questions:

- What are my chances of having a child by using ART?
- Where can I go to get this treatment?

The Society for Assisted Reproductive Technology (SART), an organization of ART providers affiliated with the American Society for Reproductive Medicine (ASRM), has been collecting data and publishing annual reports of pregnancy success rates for fertility clinics in the United States and Canada since 1989. In 1992, the U.S. Congress passed the Fertility Clinic Success Rate and Certification Act. This law requires the Centers for Disease Control and Prevention (CDC) to publish pregnancy success rates for ART in fertility clinics in the United States. Since 1995, CDC has worked in consultation with SART and ASRM to report ART success rates.

The 2007 report of pregnancy success rates is the twelfth to be issued under the law. This report is based on the latest available data on the type, number, and outcome of ART cycles performed in U.S. clinics.

The 2007 ART report has four major sections:

- ***Commonly asked questions about the U.S. ART clinic reporting system.*** This section provides background information on infertility and ART and an explanation of the data collection, analysis, and publication processes.
- ***A national report.*** The national report section presents overall success rates and shows how they are affected by certain patient and treatment characteristics. Because the national report summarizes findings from all 430 fertility clinics that reported data, it can give people considering ART a good idea of the average chance of having a child by using ART.
- ***Fertility clinic tables.*** Success also is related to the expertise of a particular clinic's staff, the quality of its laboratory, and the characteristics of the patient population. The fertility clinic table section displays ART results and success rates for individual U.S. fertility clinics in 2007.
- ***Appendixes:***

  Appendix A contains technical notes on the interpretation of 95% confidence intervals and findings from the data validation visits to selected fertility clinics.

  Appendix B (Glossary) provides definitions for technical and medical terms used throughout the report.

Appendix C includes the current names and addresses of all reporting clinics along with a list of clinics known to be in operation in 2007 that did not report their success rate data to CDC as required by law.

Appendix D includes the names and addresses of national consumer organizations that offer support to people experiencing infertility.

Success rates can be reported in a variety of ways, and the statistical aspects of these rates can be difficult to interpret. As a result, presenting information about ART success rates is a complex task. This report is intended for the general public, and the emphasis is on presenting the information in an easily understandable form. CDC hopes that this report is informative and helpful to people considering an ART procedure. We welcome any suggestions for improving the report and making it easier to use. (See contact information, inside front cover.)

Commonly Asked Questions About the U.S. ART Clinic Reporting System

Background Information, Data Collection Methods, Content and Design of the Report, and Additional Information About ART in the United States

1. How many people in the United States have infertility problems?

The latest data on infertility available to the Centers for Disease Control and Prevention (CDC) are from the 2002 National Survey of Family Growth.

- Of the approximately 62 million women of reproductive age in 2002, about 1.2 million, or 2%, had had an infertility-related medical appointment within the previous year and an additional 10% had received infertility services at some time in their lives. (Infertility services include medical tests to diagnose infertility, medical advice and treatments to help a woman become pregnant, and services other than routine prenatal care to prevent miscarriage.)
- Additionally, 7% of married couples in which the woman was of reproductive age (2.1 million couples) reported that they had not used contraception for 12 months and the woman had not become pregnant.

2. What is assisted reproductive technology (ART)?

Although various definitions have been used for ART, the definition used in this report is based on the 1992 law that requires CDC to publish this report. According to this definition, ART includes all fertility treatments in which both eggs and sperm are handled. In general, ART procedures involve surgically removing eggs from a woman's ovaries, combining them with sperm in the laboratory, and returning them to the woman's body or donating them to another woman. They do NOT include treatments in which only sperm are handled (i.e., intrauterine—or artificial—insemination) or procedures in which a woman takes drugs only to stimulate egg production without the intention of having eggs retrieved.

The types of ART include the following:

- ***IVF (in vitro fertilization).*** Involves extracting a woman's eggs, fertilizing the eggs in the laboratory, and then transferring the resulting embryos into the woman's uterus through the cervix. For some IVF procedures, fertilization involves a specialized technique known as intracytoplasmic sperm injection (ICSI). In ICSI, a single sperm is injected directly into the woman's egg.
- ***GIFT (gamete intrafallopian transfer).*** Involves using a fiber-optic instrument called a laparoscope to guide the transfer of unfertilized eggs and sperm (gametes) into the woman's fallopian tubes through small incisions in her abdomen.
- ***ZIFT (zygote intrafallopian transfer).*** Involves fertilizing a woman's eggs in the laboratory and then using a laparoscope to guide the transfer of the fertilized eggs (zygotes) into her fallopian tubes.

In addition, ART often is categorized according to whether the procedure used a woman's own eggs (nondonor) or eggs from another woman (donor) and according to whether the embryos used were newly fertilized (fresh) or previously fertilized, frozen, and then thawed (frozen). Because an ART procedure includes several steps, it is typically referred to as a cycle of treatment. (See **What is an ART cycle?** below.)

3. What is an ART cycle?

Because ART consists of several steps over an interval of approximately 2 weeks, an ART procedure is more appropriately considered a ***cycle*** of treatment rather than a procedure at a single point in time. The start of an ART cycle is considered to be when a woman begins taking drugs to stimulate egg production or starts ovarian monitoring with the intent of having embryos transferred. (See Figure 5, page 19, for a full description of the steps in an ART cycle.) For the purposes of this report, data on ***all cycles that were started,*** even those that were discontinued before all steps were undertaken, are submitted to CDC through a Web-based data collection system called the National ART Surveillance System (NASS) and are counted in the clinic's success rates.

4. How do U.S. ART clinics report data to CDC about their success rates?

CDC contracts with a statistical survey research organization, Westat, to obtain the data published in the ART success rates report. Westat maintains a list of all ART clinics known to be in operation and tracks clinic reorganizations and closings. This list includes clinics and individual providers that are members of the Society for Assisted Reproductive Technology (SART) as well as clinics and providers that are not SART members. Westat actively follows up reports of ART physicians or clinics not on its list to update the list as needed. Westat maintains NASS, the Web-based data collection system that all ART clinics use. Clinics either electronically enter or import data into NASS for each ART procedure they start in a given reporting year. The data collected include information on the client's medical history (such as infertility diagnoses), clinical information pertaining to the ART procedure, and information on resulting pregnancies and births.

See below **(Why is the report of 2007 success rates being published in 2009?)** for a complete description of the reporting process.

5. Why is the report of 2007 success rates being published in 2009?

Before success rates based on live births can be calculated, every ART pregnancy must be followed up to determine whether a birth occurred. Therefore, the earliest that clinics can report complete annual data is late in the year after ART treatment was initiated (about 9 months past year-end, when all the births have occurred). Accordingly, the results of all the cycles initiated in 2007 were not known until October 2008. After ART outcomes are known, the following occurs before the report is published:

- Clinics enter their data into NASS and verify the data's accuracy before sending the data to Westat.
- Westat compiles a national data set from the data submitted by individual clinics.
- CDC data analysts conduct comprehensive checks of the numbers reported for every clinic.
- Clinic tables, national figures, and accompanying text for both the printed and Internet versions of the report are compiled and laid out.

- CDC and Westat review the report.
- Necessary changes are incorporated and proofread.
- The report is submitted to the Government Printing Office to begin the printing and production process.

These steps are time-consuming but essential for ensuring that the report provides the public with correct information particularly regarding each clinic's success rates.

6. Which clinics are represented in this report?

The data in both the national report and the individual fertility clinic tables come from 430 fertility clinics that provided and verified information about the outcomes of the ART cycles started in their clinics in 2007.

Although we believe that almost all clinics that provided ART services in the United States throughout 2007 are represented in this report, data for a few clinics or practitioners are not included because they either were not in operation throughout 2007 or did not report as required. Clinics and practitioners known to have been in operation throughout 2007 that did not report and verify their data are listed in this report as nonreporters, as required by law (see Appendix C, Nonreporting ART Clinics for 2007, by State, on pages 574–577). We will continue to make every effort to include in future reports all clinics and practitioners providing ART services.

7. Why doesn't CDC rank the clinics?

Because the decision to undergo ART treatment is a very personal decision, this report may not contain all of the information that a woman or a couple needs to decide which ART clinic or procedure is best for their treatment. Many factors contribute to the success rate of an ART procedure in particular patients, and a difference in success rates between two ART programs may reflect differences in the groups of patients treated, the types of procedures used, or other factors. More explanations on how to use the success rates and other statistics published in this report are in the Introduction to Fertility Clinic Tables (pages 81–90). The report should be used to help people considering an ART procedure find clinics where they can meet personally with ART providers to discuss their specific medical situation and their likelihood of success using ART. Contacting a clinic also may provide additional information that could be helpful in deciding whether or not to use ART. Because ART offers several treatment options for infertility, there are many other factors that may affect the decision. Going through repeated ART cycles requires substantial commitments of time, effort, money, and emotional energy. Therefore, this report may be a helpful starting point for consumers to obtain information and consider their options.

8. Does this report include all ART cycles performed by the reporting clinics?

This report includes data for the 142,435 cycles performed in 2007 by the 430 clinics that reported their data as required. A small number of ART cycles are not included in either the national data or the individual fertility clinic tables. These were cycles in which a new treatment procedure was being evaluated. Only 95 ART cycles fell into this category in 2007.

9. How are the success rates determined?

This report presents several measures of success for ART (see Figure 7, page 21), including the percentage of ART cycles that result in a pregnancy. The pregnancies reported here were diagnosed using an ultrasound procedure. All live-birth deliveries were reported to the ART physician by either the patient or her obstetric provider. Because this report is geared toward patients, the focus is on the percentage of cycles resulting in live births. Singleton live births are presented as a separate measure of success because they have a much lower risk than multiple-infant births for adverse infant health outcomes, including prematurity, low birth weight, disability, and death. As noted throughout the report, success rates were additionally calculated at various steps of the ART cycle to provide a complete picture of the chances for success as the cycle progresses.

10. What are my chances of getting pregnant using ART?

Many women ask this question because they assume that the pregnancy will lead to a live birth. Unfortunately, not all ART procedures that result in a pregnancy lead to the delivery of a live infant. For example, in 2007, 101,897 fresh–nondonor ART cycles were started. Of those, 36,079 (35%) led to a pregnancy, but only 29,556 (29%) resulted in a live birth. In other words, 18% of ART pregnancies did not result in a live birth. The percentage of cycles resulting in live births will give a more accurate answer to the question, "If I have an ART procedure, what is my chance that I will have a baby?"

It is important to note that multiple-fetus pregnancies and multiple-infant births are common with ART (see Figure 10, page 24). Multiple-infant births are associated with greater risk for adverse health outcomes for both the mother and the infants (see Figures 11 and 12 on preterm deliveries and low birth weight, pages 25 and 26). This report also includes singleton live births as a measure of success because they have a lower risk of adverse health outcomes.

11. If a woman has had more than one ART treatment cycle, how is the success rate calculated? Alternatively, how many cycles does a woman usually go through before getting pregnant?

As required by law, this report presents ART success rates in terms of how many cycles were started each year, rather than in terms of how many women were treated. (A cycle starts when a woman begins taking fertility drugs or having her ovaries monitored for follicle production.) Clinics do not report to CDC the number of women treated at each facility. Because clinics report information only on outcomes for each cycle started, it is not possible to compute the success rates on a "per woman" basis, or the number of cycles that an average woman may undergo before achieving success.

12. What factors that influence success rates are presented in this report?

The national report presents a more in-depth picture of ART than can be shown for each individual clinic. Success rates are presented in the context of various patient and treatment characteristics that may influence success. These characteristics include age, infertility diagnosis, history of previous births, previous miscarriages, previous ART cycles, number of embryos transferred, type of ART procedure, use of techniques such as ICSI, and clinic size.

13. What quality control steps are used to ensure data accuracy?

To have their success rates published in this annual report, clinics have to submit their data in time for analysis and the clinics' medical directors have to verify by signature that the tabulated success rates are accurate. Then, Westat conducts an in-house review and contacts the clinics if corrections are necessary. After the data have been verified, a quality control process called validation begins. This year, 35 of 430 reporting clinics were randomly selected for site visits. Members of the Westat Validation Team visited these clinics and reviewed medical record data for a sample of the clinic's ART cycles. For each cycle, the validation team abstracted information from the patient's medical record. The abstracted information was then reviewed on-site and compared with the data submitted for the report. CDC staff members participated as observers in some of the visits. For each clinic, the sample of cycles validated included all cycles that were reported to have multiple-fetus pregnancies and a random sample of up to 50 additional cycles. In almost all cases, data available in the medical records on pregnancies and births were consistent with reported data. Validation primarily helps ensure that clinics are being careful to submit accurate data. It also serves to identify any systematic problems that could cause data collection to be inconsistent or incomplete.

The data validation process does not include any assessment of clinical practice or overall record keeping. See Appendix A, Technical Notes (pages 525–528), for a more detailed presentation of findings from the validation visits.

14. How does CDC use the variables/data collected but not reported in the annual Assisted Reproductive Technology Success Rates National Summary and Fertility Clinic Reports?

CDC uses the data collected and not reported in the annual assisted reproductive technology (ART) report to evaluate emerging ART research questions and to monitor safety and efficacy issues related to ART treatment for improving maternal and child outcomes. Other data may not be released in order to protect the ART patient's confidentiality. A list of publications is available at http://www.cdc.gov/ART/pubs.htm.

15. How does CDC ensure the confidentiality of the assisted reproductive technology data it collects?

CDC has an Assurance of Confidentiality for the Assisted Reproductive Technology (ART) database. An Assurance of Confidentiality is a formal confidentiality protection authorized under Section 308(d) of the Public Health Service Act (42 U.S.C. 242[m]). An assurance is used for projects conducted by CDC

staff or contractors involving the collection or maintenance of sensitive identifiable or potentially identifiable information. The assurance allows CDC programs to assure individuals and institutions involved in research or non-research projects that those conducting the project will protect the confidentiality of the data collected. Under PHSA Section 308(d), no identifiable information may be used for any purpose other than the purpose for which it was supplied unless such institution or individual has consented to that disclosure. CDC's current assurance of confidentiality for this project is ongoing.

16. Why doesn't the report contain specific medical information about ART?

This report describes a woman's average chances of success using ART. Although the report provides some information about factors such as age and infertility diagnosis, individual couples face many unique medical situations. This population-based registry of ART procedures cannot capture detailed information about specific medical conditions associated with infertility. A physician in clinical practice should be consulted for the individual evaluation that will help a woman or couple understand their specific medical situation and their chances of success using ART.

17. Why are summary statistics in the Fertility Clinic tables published by CDC different from summary statistics reported in the SART National Summary?

From 1996–2007, the percentage of ART clinics reporting data to CDC with a SART membership ranged from approximately 90% to 95%. Annual summary statistics of ART treatments performed in each of these clinics are available online at http://www.sart.org/. Although the same table items are used in both the CDC's Fertility Clinic Table and SART National Summary (except for one item—percentage of transferred embryos resulting in a successful implantation, which is not available in CDC's table), discrepancies in tabulated statistics between the SART and CDC tables may be due to (1) the inclusion, in the CDC tables, of ART treatments performed at non-SART member clinics; (2) differences in the data submission deadlines between SART and CDC. Differences in submission dates may result in ART clinics being excluded from the CDC annual report but not from the SART National Summary report; and (3) differences in data processing procedures and statistical methods used to generate statistics.

18. What is CDC doing to ensure that the report is helpful to the public?

CDC reviews comments from patients and providers about things to consider including in future ART reports. In early 2007, CDC, The American Fertility Association, and RESOLVE: The National Infertility Association, asked ART clinic staff about their experiences using the ART report. We also conducted in-depth interviews with patients who had used the ART report in the past and with patients who were seeking ART services. The final report, *Consumer Feedback on CDC ART Success Rates Report,* was completed February 2008. In the consumer report, respondents suggested specific ways to improve the ART report and specific analyses that might benefit public health. CDC will utilize the suggestions to revise the ART report and guide future analyses. If you have suggestions for improving the report, visit www.cdc.gov/ART and click on the Contact Us link or e-mail your suggestions to cdcinfo@cdc.gov.

19. Does CDC have any information on the age, race, income, and education levels of women who donate eggs?

CDC does not collect information on egg donors beyond what is presented in this report. Success rates for cycles using donor eggs or using embryos derived from donor eggs are presented separately based on the ART patient's age.

20. Are there any medical guidelines for ART performed in the United States?

The American Society for Reproductive Medicine (ASRM) and SART issue guidelines dealing with specific ART practice issues, such as the number of embryos to be transferred in an ART procedure. Further information can be obtained from ASRM or SART (both at telephone 205-978-5000 or Web sites www.asrm.org and www.sart.org).

21. Where can I get additional information on U.S. fertility clinics?

For further information on specific clinics, contact the clinic directly (see Appendix C for current contact information). In addition, SART can provide general information on its member clinics (telephone 205-978-5000, extension 109).

22. What's new in the 2007 report?

Overall, the content and format of this report are similar to those used in previous years. New information includes the following:

National Report:

- Summary statistics for the age group of >42 are now presented in two categories: 43–44, and >44.

National Report, Section 5: ART Trends, 1998–2007 (Figures 49–64, pages 63–78):

- National report trend figures are limited to the most recent 10 years, 1998–2007.

National Summary Table:

- Summary statistics for the age group of >42 are now presented in two categories: 43–44, and >44.

Individual Fertility Clinic Tables:

- Summary statistics for the age group of >42 are now presented in two categories: 43–44, and >44.
- The ART cycle profile now includes summary statistics for the use of Preimplantation Genetic Diagnosis (PGD).

2007

National Report

INTRODUCTION TO THE 2007 NATIONAL REPORT

Data provided by U.S. clinics that use assisted reproductive technology (ART) to treat infertility are a rich source of information about the factors that contribute to a successful ART treatment—the delivery of a live-born infant. Pooling the data from all reporting clinics provides an overall national picture that could not be obtained by examining data from an individual clinic.

A woman's chances of having a pregnancy and a live birth by using ART are influenced by many factors, some of which are patient-related and outside a clinic's control (e.g., the woman's age, the cause of infertility). Because the national data set includes information on many of these factors, it can give potential ART users an idea of their average chances of success. Average chances, however, do not necessarily apply to a particular individual or couple. People considering ART should consult their physician to discuss all the factors that apply in their particular case.

The data for this national report come from the 430 fertility clinics in operation in 2007 that provided and verified data on the outcomes of all ART cycles started in their clinics. The 142,435 ART cycles performed at these reporting clinics in 2007 resulted in 43,412 live births (deliveries of one or more living infants) and 57,569 infants.

The national report consists of graphs and charts that use 2007 data to answer specific questions related to ART success rates. These figures are organized according to the type of ART procedure used. Some ART procedures use a woman's own eggs, and others use donated eggs or embryos. (Although sperm used to create an embryo also may be either from a woman's partner or from a sperm donor, information in this report is presented according to the source of the egg.) In some procedures, the embryos that develop are transferred back to the woman (fresh embryo transfer); in others, the embryos are frozen (cryopreserved) for transfer at a later date. This report includes data on frozen embryos that were thawed and transferred in 2007.

The national report has five sections:

- Section 1 (Figures 1 through 4) presents information from all ART procedures reported.
- Section 2 (Figures 5 through 41) presents information on the ART cycles that used only fresh embryos from nondonor eggs or, in a few cases, a mixture of fresh and frozen embryos from nondonor eggs (101,897 cycles resulting in 82,347 transfers).
- Section 3 (Figures 42 and 43) presents information on the ART cycles that used only frozen embryos from nondonor eggs (23,133 cycles resulting in 21,265 transfers).
- Section 4 (Figures 44 through 48) presents information on the ART cycles that used only donated eggs or embryos (17,405 cycles resulting in 15,954 transfers).
- Section 5 (Figures 49 through 64) presents trends in the number of ART procedures and success rates over the past 10 years, from 1998 through 2007.

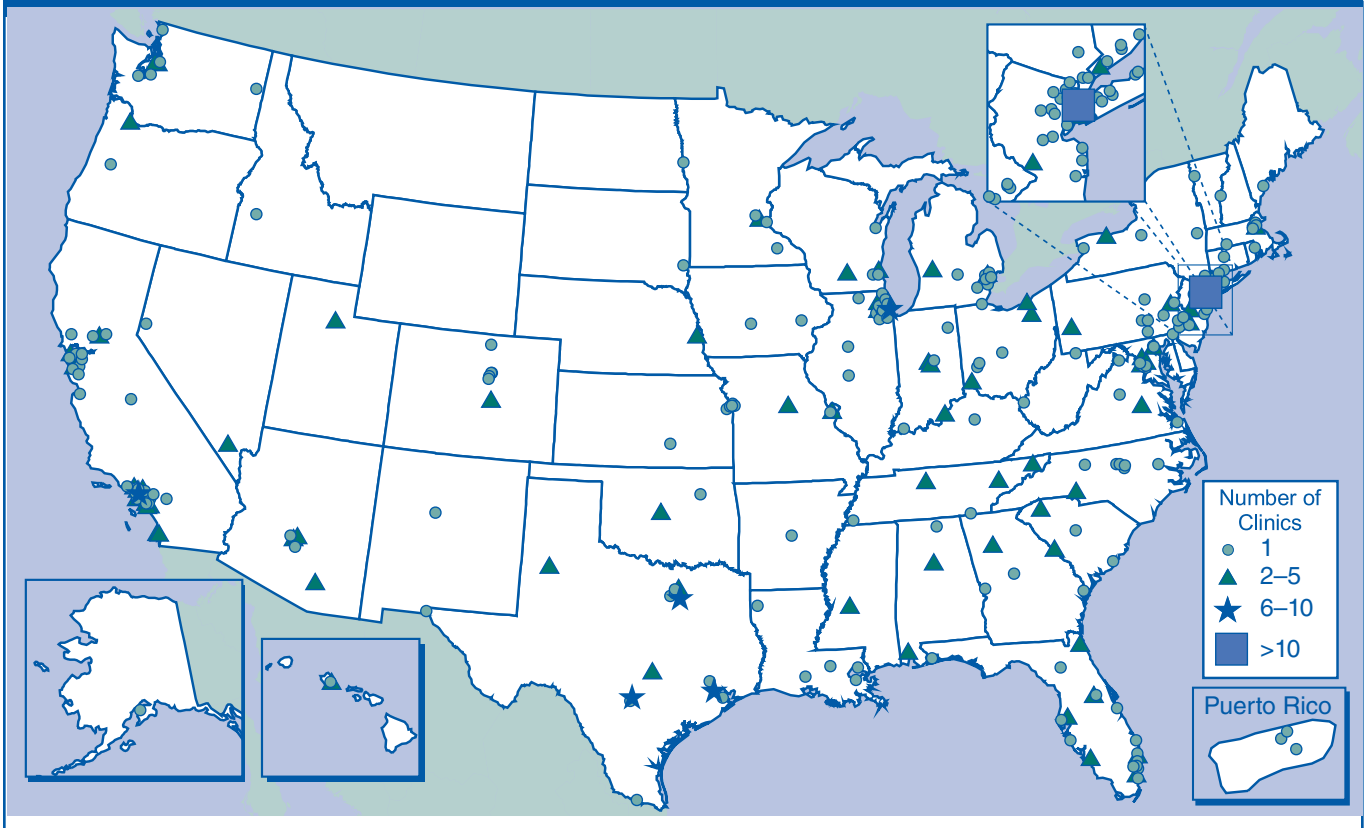
The 2007 national summary table, which is based on data from all clinics included in this report, is on page 91, immediately preceding the individual clinic tables. An explanation of how to read these tables is on pages 85–90.

SECTION 1: OVERVIEW

Where are U.S. ART clinics located, how many ART cycles did they perform in 2007, and how many infants were born from these ART cycles?

Although ART clinics are located throughout the United States, generally in or near major cities, the greatest number of clinics is in the eastern United States. Figure 1 shows the locations of the 430 reporting clinics. The fertility clinic section of this report, arranged in alphabetical order by state, city, and clinic name, provides specific information on each of these clinics. The number of clinics, cycles performed, live-birth deliveries, and infants born as a result of ART all have increased steadily since CDC began collecting this information in 1995 (see Section 5, pages 63–78). Because in some cases more than one infant is born during a live-birth delivery (e.g., twins), the total number of infants born is greater than the number of live-birth deliveries. CDC estimates that ART accounts for slightly more than 1% of total U.S. births.

Figure 1
Location of ART Clinics in the United States and Puerto Rico, 2007



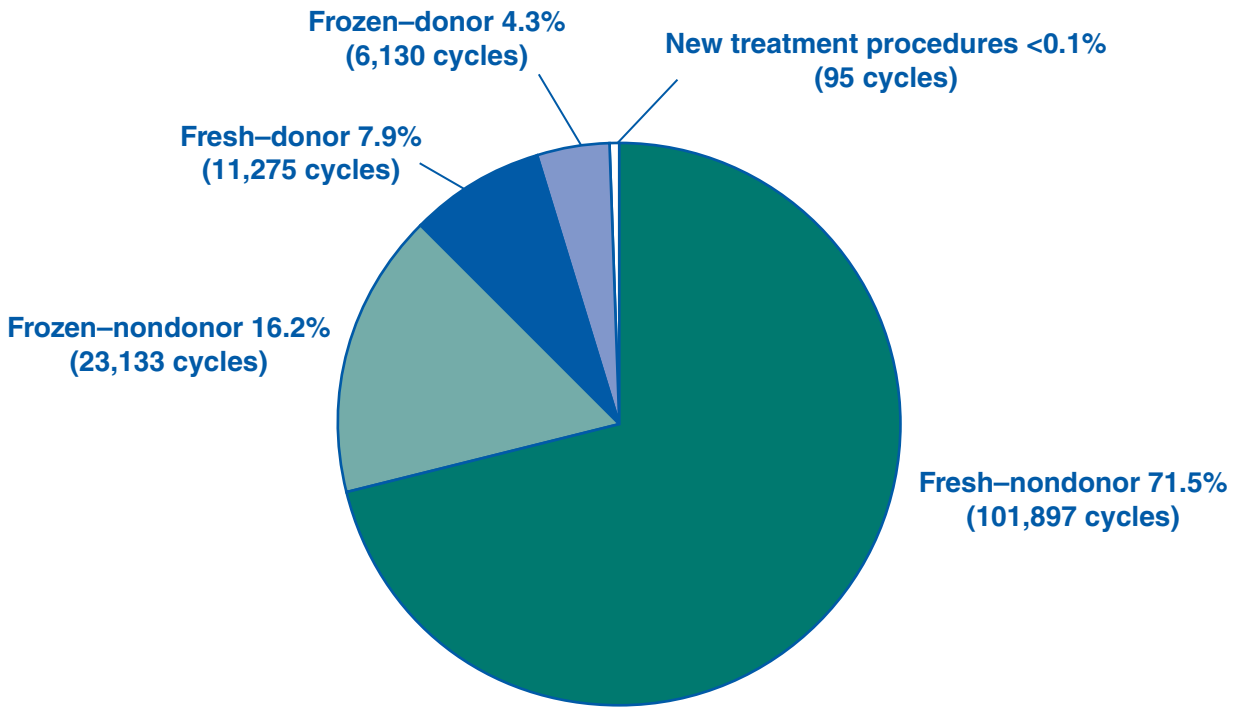
Number of ART clinics in the United States in 2007	483
Number of ART clinics that submitted data in 2007	430
Number of ART cycles reported in 2007	142,435*
Number of live-birth deliveries resulting from ART cycles started in 2007	43,412
Number of infants born as a result of ART cycles performed in 2007	57,569

* Note: This number does not include 95 cycles in which a new treatment procedure was being evaluated (see Figure 2, page 16).

What types of ART cycles were used in the United States in 2007?

For approximately 72% of ART cycles performed in 2007, fresh nondonor eggs or embryos were used. ART cycles that used frozen nondonor embryos were the next most common type, accounting for approximately 16% of the total. In about 12% of cycles, eggs or embryos were donated by another woman. A very small number of cycles (less than 0.1% of the ART cycles performed in 2007) involved the evaluation of a new treatment procedure. Cycles in which a new treatment procedure was being evaluated are not included in the total number of cycles reported in the national report or in the individual fertility clinic tables. Thus, data presented in subsequent figures in this report and in the individual fertility clinic tables are based on 142,435 ART cycles.

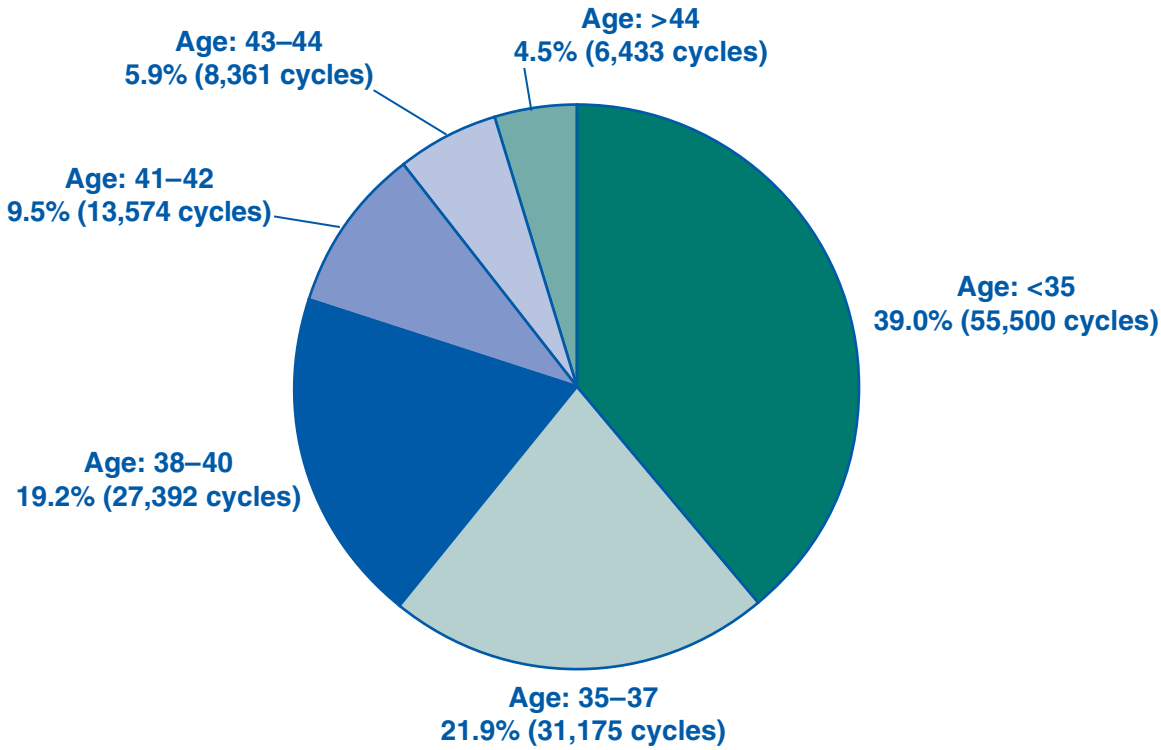
Figure 2
Types of ART Cycles—United States, 2007



How old were women who used ART in the United States in 2007?

The average age of women using ART services in 2007 was 36. The largest group of women using ART services were women younger than 35, representing 39% of all ART cycles performed in 2007. Twenty-two percent of ART cycles were performed among women aged 35–37, 19% among women aged 38–40, 10% among women aged 41–42, 6% among women aged 43–44, and 5% among women older than 44.

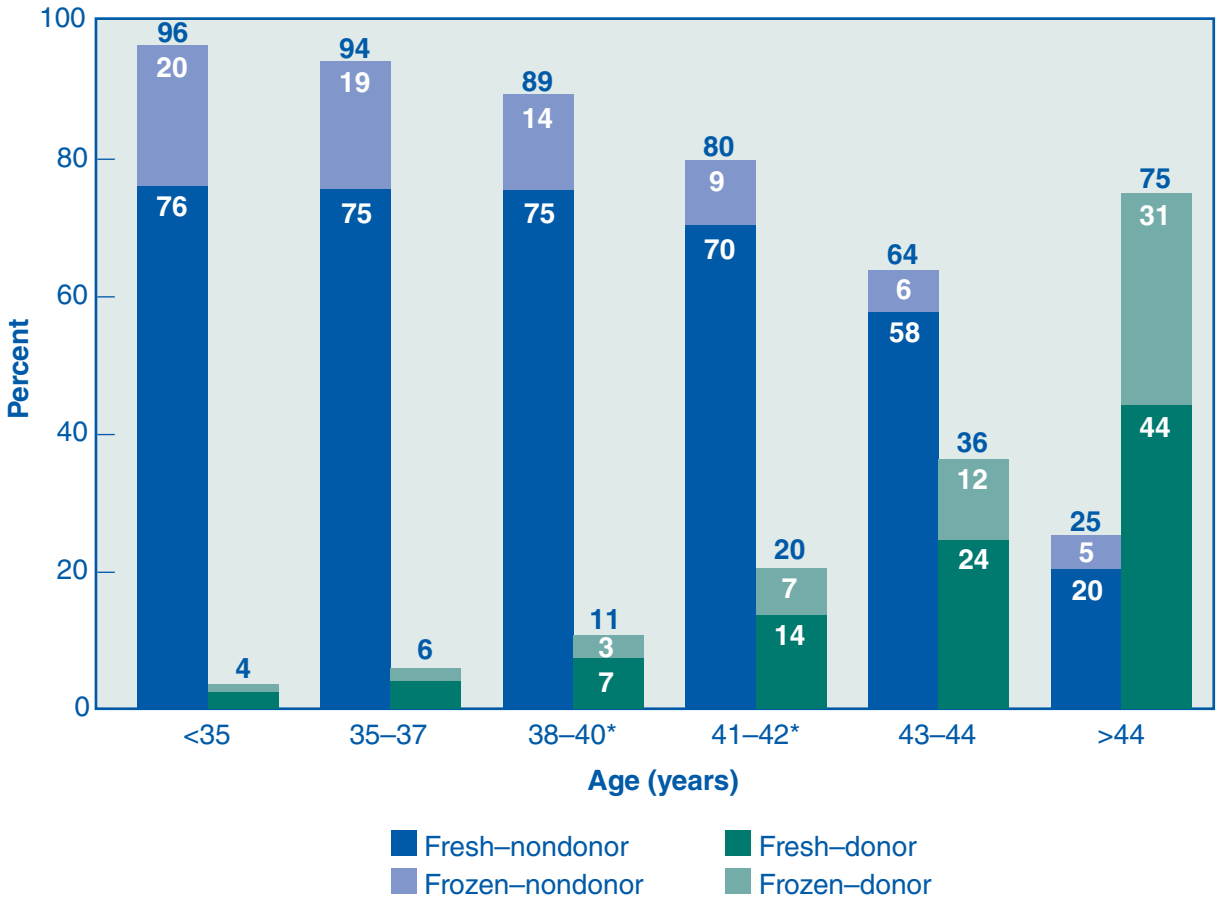
Figure 3
ART Use by Age Group—United States, 2007



How did the types of ART cycles used in the United States in 2007 differ among women of different ages?

Figure 4 shows that, in 2007, the type of ART cycles varied by the woman's age. The vast majority (96%) of women younger than 35 used their own eggs, whereas only 4% used donor eggs. In contrast, 36% of women aged 43–44 and three-fourths (75%) of women older than 44 used donor eggs. Across all age groups, more ART cycles using fresh eggs or embryos were performed than cycles using frozen embryos.

Figure 4
Types of ART Cycles by Age Group—United States, 2007



*Sum of percentages as shown within each bar does not equal the total shown at the top of each bar due to rounding.

SECTION 2: ART CYCLES USING FRESH NONDONOR EGGS OR EMBRYOS

What are the steps for an ART cycle using fresh nondonor eggs or embryos?

Figure 5 presents the steps for an ART cycle using fresh nondonor eggs or embryos and shows how ART users in 2007 progressed through these stages toward pregnancy and live birth.

An ART **cycle is started** when a woman begins taking medication to stimulate the ovaries to develop eggs or, if no drugs are given, when the woman begins having her ovaries monitored (using ultrasound or blood tests) for natural egg production.

If eggs are produced, the cycle then progresses to **egg retrieval**, a surgical procedure in which eggs are collected from a woman's ovaries.

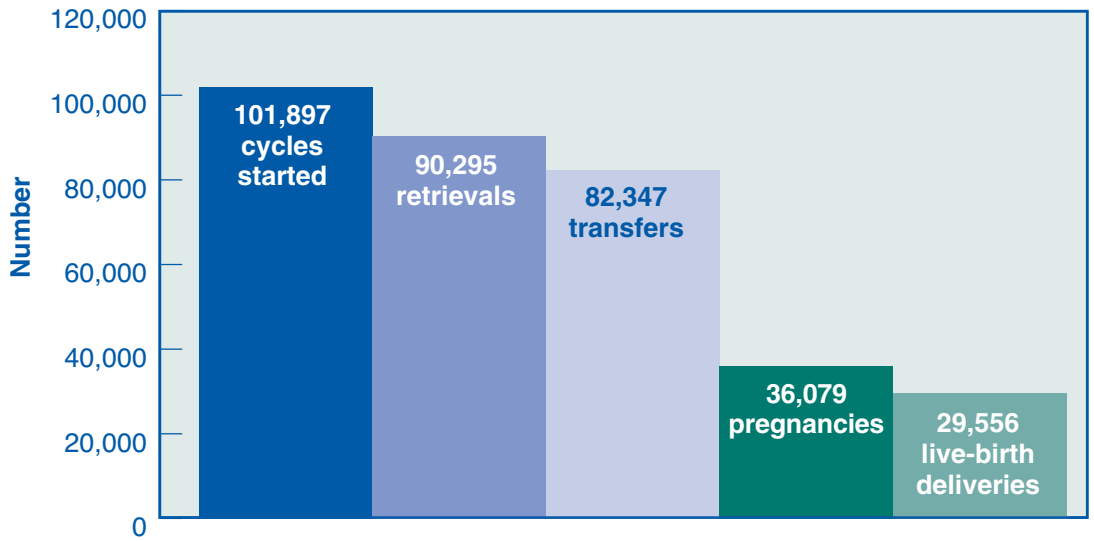
Once retrieved, eggs are combined with sperm in the laboratory. If fertilization is successful, one or more of the resulting embryos are selected for **transfer**, most often into a woman's uterus through the cervix (IVF), but sometimes into the fallopian tubes (e.g., GIFT, ZIFT; see pages 532 and 533 for definitions).

If one or more of the transferred embryos implant within the woman's uterus, the cycle then may progress to clinical **pregnancy**.

Finally, the pregnancy may progress to a **live birth**, the delivery of one or more live-born infants. (The birth of twins, triplets, or more is counted as one live birth.)

A cycle may be discontinued at any step for specific medical reasons (e.g., no eggs are produced, the embryo transfer was not successful) or by patient choice.

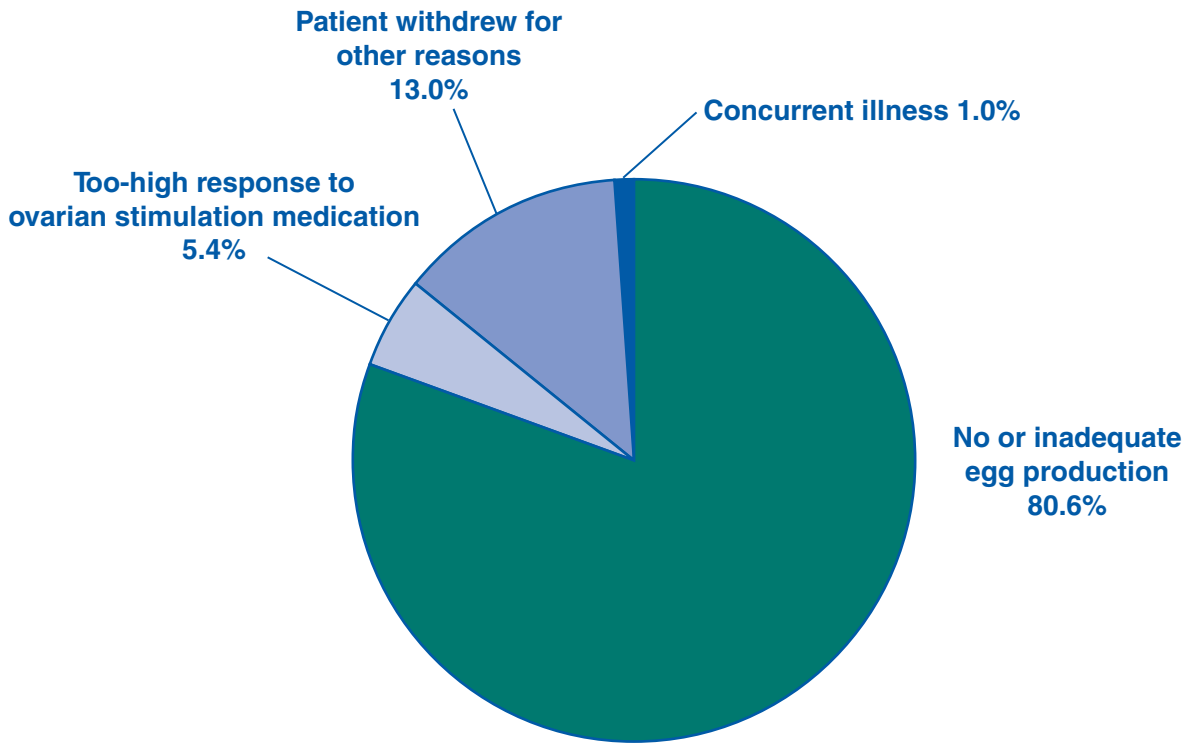
Figure 5
Outcome of ART Cycles Using Fresh Nondonor Eggs or Embryos, by Stage, 2007



Why are some ART cycles discontinued?

In 2007, 11,602 ART cycles (about 11% out of all fresh-nondonor cycles started, 101,897) were discontinued before the egg retrieval step (see Figure 5, page 19). Figure 6 shows reasons that the cycles were discontinued. For approximately 81% of these cycles, there was no or inadequate egg production. Other reasons included too high a response to ovarian stimulation medications (i.e., potential for ovarian hyperstimulation syndrome), concurrent medical illness, or a patient's personal reasons.

Figure 6
Reasons ART Cycles Using Fresh Nondonor Eggs or Embryos Were Discontinued,* 2007



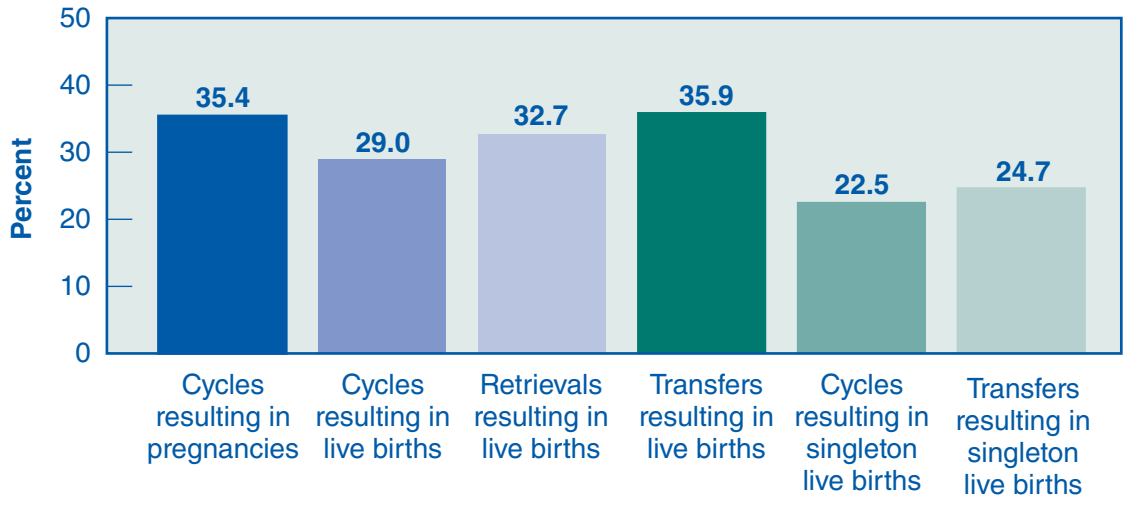
*Based on 11,602 ART cycles.

How are success rates of ART measured?

Figure 7 shows ART success rates using six different measures, each providing slightly different information about this complex process. The vast majority of success rates have increased slightly each year since CDC began monitoring them in 1995 (see Section 5, pages 63–78).

- **Percentage of ART cycles started that produced a pregnancy:** This is higher than the percentage of cycles that resulted in a live birth because some pregnancies end in miscarriage, induced abortion, or stillbirth (see Figure 9, page 23).
- **Percentage of ART cycles started that resulted in a live birth (a delivery of one or more live-born infants):** This is the one many people are most interested in because it represents the average chance of having one or more live-born infants by using ART. *This is referred to as the basic live birth rate in the Fertility Clinic Success Rate and Certification Act of 1992.*
- **Percentage of ART cycles in which eggs were retrieved that resulted in a live birth:** This is generally higher than the percentage of cycles that resulted in a live birth because it excludes cycles that were canceled before eggs were retrieved. In 2007, about 11% of all cycles using fresh nondonor eggs or embryos were canceled for a variety of reasons (see Figure 6, page 20). *This is referred to as the live birth rate per successful oocyte (egg) retrieval in the Fertility Clinic Success Rate and Certification Act of 1992.*
- **Percentage of ART cycles in which an embryo or egg and sperm transfer occurred that resulted in a live birth:** This is the highest of these six measures of ART success.
- **Percentage of ART cycles started that resulted in a singleton live birth:** Overall, singleton live births have a much lower risk than multiple-infant births for adverse infant health outcomes, including prematurity, low birth weight, disability, and death.
- **Percentage of ART cycles in which an embryo or egg and sperm transfer occurred that resulted in a singleton live birth:** This is higher than the percentage of ART cycles started that resulted in a singleton live birth because not all ART cycles proceed to embryo transfer.

Figure 7
Measures of Success for ART Cycles Using Fresh Nondonor Eggs or Embryos, 2007

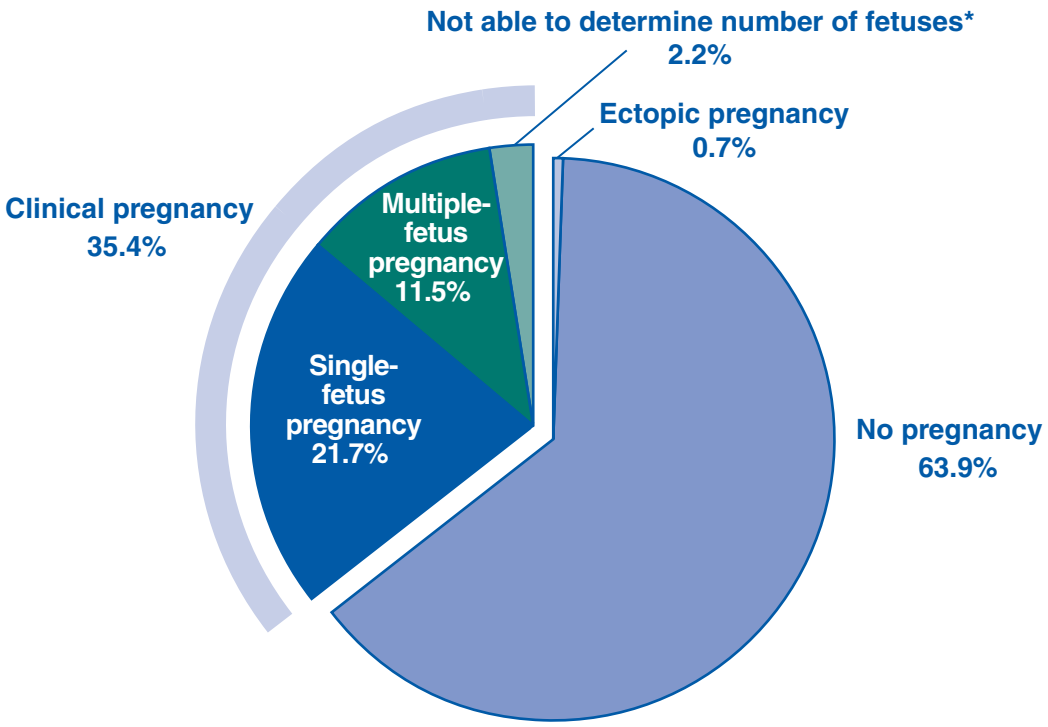


What percentage of ART cycles result in a pregnancy?

Figure 8 shows the results of ART cycles in 2007 that used fresh nondonor eggs or embryos. Most of these cycles (64%) did not produce a pregnancy; a very small proportion (less than 1%) resulted in an ectopic pregnancy (the embryo implanted outside the uterus), and 35% resulted in clinical pregnancy. Clinical pregnancies, accounting for more than one-third of cycles, can be further subdivided as follows:

- Approximately 22% resulted in a single-fetus pregnancy.
- Approximately 12% resulted in a multiple-fetus pregnancy.
- Approximately 2% ended in miscarriage before the number of fetuses could be accurately determined.

Figure 8
Results of ART Cycles Using Fresh Nondonor Eggs or Embryos, 2007



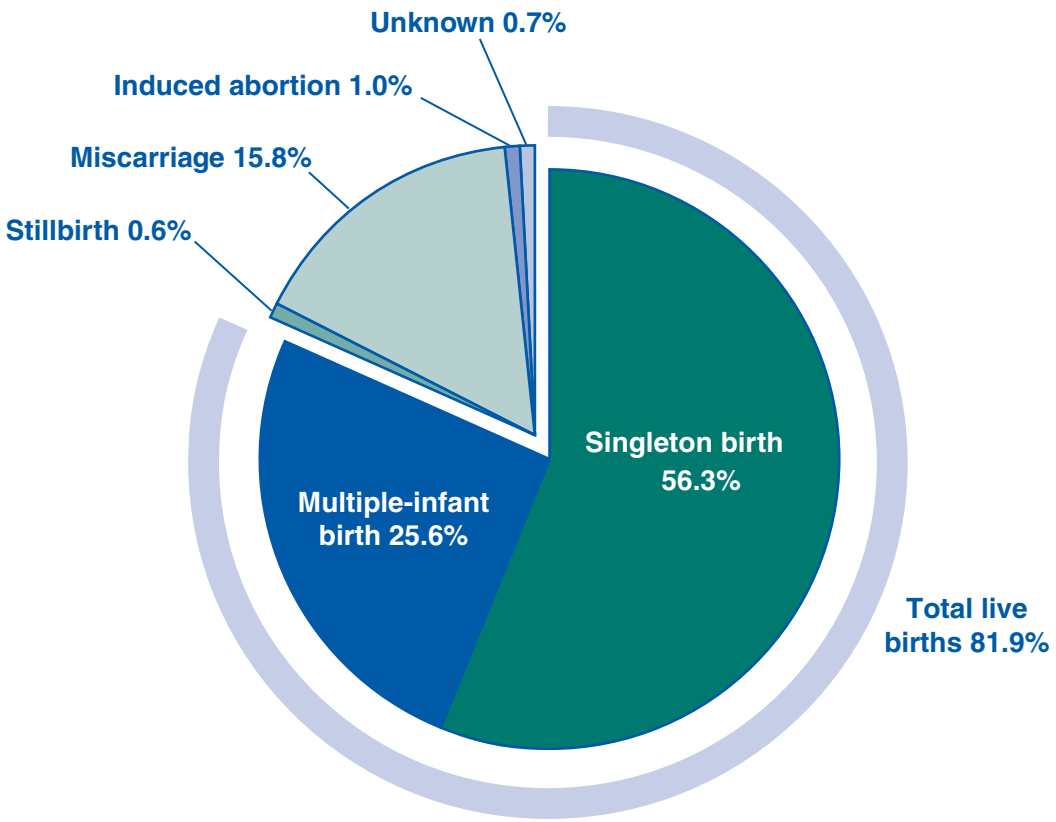
*Number of fetuses not known because the pregnancy ended in an early miscarriage.

Using ART, what percentage of pregnancies result in a live birth?

Figure 9 shows the outcomes of pregnancies resulting from ART cycles using fresh nondonor eggs or embryos in 2007. Approximately 82% of the pregnancies resulted in a live birth (56% in a singleton birth and 26% in a multiple-infant birth). About 17% of pregnancies resulted in miscarriage, stillbirth, induced abortion, or maternal death prior to birth. For less than 1% of pregnancies, the outcome was unknown.

Although the birth of more than one infant is counted as one live birth, multiple-infant births are presented here as a separate category because they often are associated with problems for both mothers and infants. Infant deaths and birth defects are not included as adverse outcomes because the available information for these outcomes is incomplete.

Figure 9
Outcomes of Pregnancies Resulting from ART Cycles Using Fresh Nondonor Eggs or Embryos,* 2007



*Maternal deaths prior to birth are not displayed due to small numbers (n = 2).

Using ART, what is the risk of having a multiple-fetus pregnancy or multiple-infant live birth?

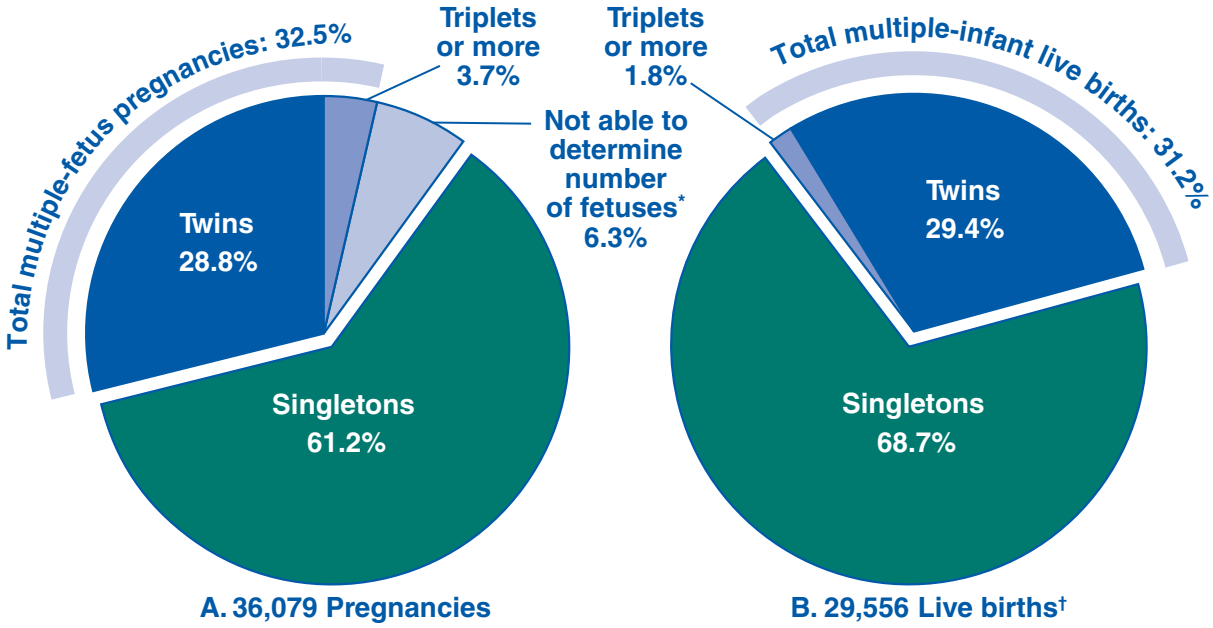
Multiple-infant births are associated with greater problems for both mothers and infants, including higher rates of caesarean section, prematurity, low birth weight, and infant disability or death.

Part A of Figure 10 shows that among the 36,079 pregnancies that resulted from ART cycles using fresh nondonor eggs or embryos, 61% were singleton pregnancies, 29% were twins, and about 4% were triplets or more. Six percent of pregnancies ended in miscarriage in which the number of fetuses could not be accurately determined. Therefore, the percentage of pregnancies with more than one fetus might have been higher than what was reported (about 33%).

In 2007, 6,278 pregnancies resulting from ART cycles ended in either miscarriage, stillbirth, induced abortion, or maternal death, and 245 pregnancy outcomes were not reported. The remaining 29,556 pregnancies resulted in live births. Part B of Figure 10 shows that approximately 31% of these live births produced more than one infant (29% twins and approximately 2% triplets or more). This compares with a multiple-infant birth rate of slightly more than 3% in the general U.S. population.

Although the total rates for multiples were similar between pregnancies and live births, there were more triplet-or-more pregnancies than births. Triplet-or-more pregnancies may be reduced to twins or singletons by the time of birth. This can happen naturally (e.g., fetal death), or a woman and her doctor may decide to reduce the number of fetuses using a procedure called multifetal pregnancy reduction. CDC does not collect information on multifetal pregnancy reductions.

Figure 10
Risks of Having Multiple-Fetus Pregnancy and Multiple-Infant Live Birth from ART Cycles Using Fresh Nondonor Eggs or Embryos, 2007



*Number of fetuses not known because the pregnancy ended in an early miscarriage.
†Total does not equal 100% due to rounding.

Using ART, what is the risk for preterm birth?

Preterm birth occurs when a woman gives birth before 37 full weeks of pregnancy. Infants born preterm are at greater risk for death in the first few days of life, as well as other adverse health outcomes including visual and hearing impairments, intellectual and learning disabilities, and behavioral and emotional problems throughout life. Preterm births also cause substantial emotional and economic burdens for families.

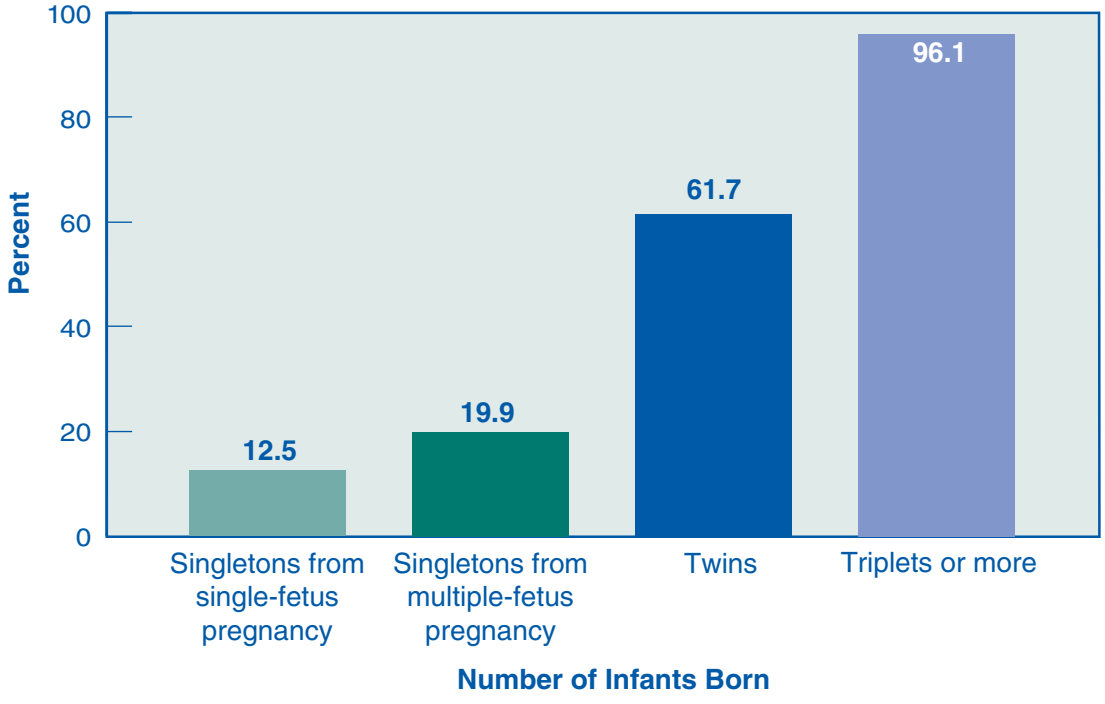
Figure 11 shows percentages of preterm births resulting from ART cycles that used fresh nondonor eggs or embryos, by the number of infants born. For singletons, it shows separately the preterm percentage for pregnancies that started with one fetus (single-fetus pregnancies) or more than one (multiple-fetus pregnancies).

Among singletons, the percentage of preterm births was higher for those from multiple-fetus pregnancies (20%) than those from single-fetus pregnancies (13%). In the general U.S. population, where singletons are almost always the result of a single-fetus pregnancy, 11% were born preterm in 2006 (most recent available data).

Among ART births, 62% of twins and 96% of triplets or more were born preterm. A comparison of preterm births between ART's multiple-fetus pregnancies and that of the general population is not meaningful because a substantial proportion of twin births or triplet and higher order births are due to infertility treatments (ART and non-ART). From 1997 to 2000, the estimated proportion of twins due to infertility treatments (ART and non-ART) ranged from 27% to 33% and the estimated proportion of triplet and higher order births remained stable at 82%.

These data indicate that the risk for preterm birth is higher among infants conceived through ART than for infants in the general population. This increase in risk is, in large part, due to the higher percentage of multiple-fetus pregnancies resulting from ART cycles.

Figure 11
Percentages of Preterm Births from ART Cycles Using Fresh Nondonor Eggs or Embryos, by Number of Infants Born, 2007



Using ART, what is the risk of having low-birth-weight infants?

Low-birth-weight infants (less than 2,500 grams, or 5 pounds, 9 ounces) are at increased risk for death and short- and long-term disabilities such as cerebral palsy, intellectual disabilities, and limitations in motor and cognitive skills.

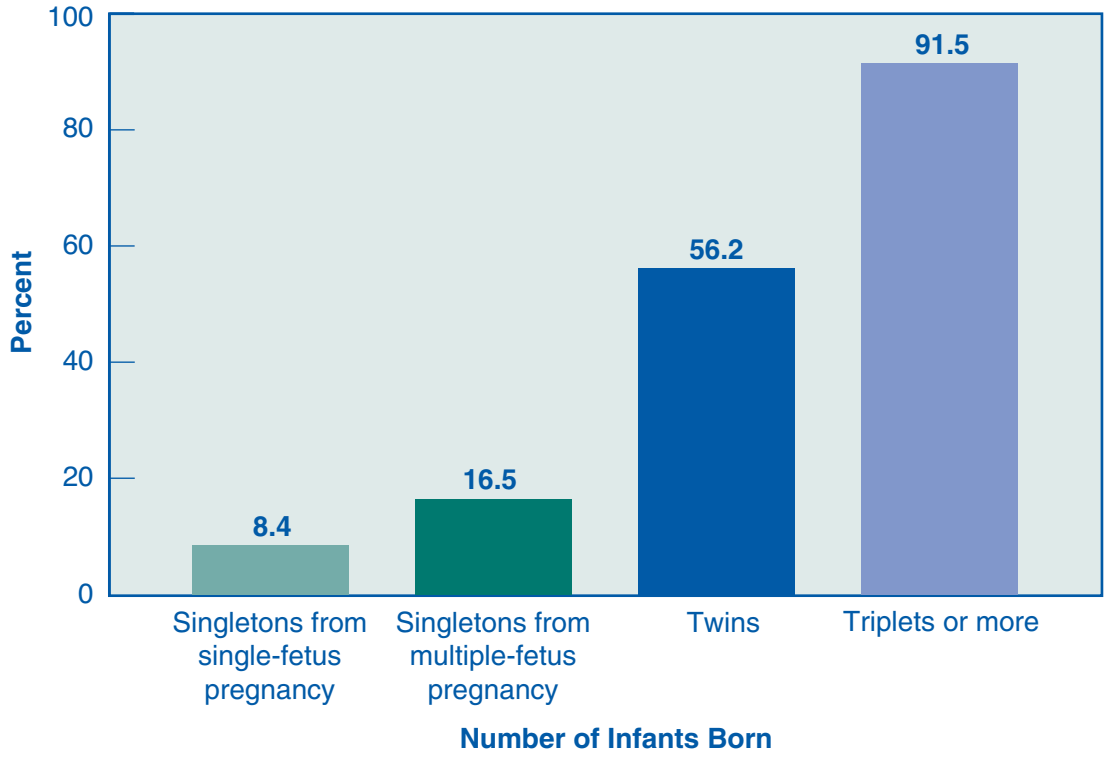
Figure 12 presents percentages of low-birth-weight infants resulting from ART cycles that used fresh nondonor eggs or embryos, by number of infants born. For singletons, it shows separately the percentage of low birth weight among infants born from pregnancies that started with one fetus (single-fetus pregnancies) and with more than one fetus (multiple-fetus pregnancies).

Among singletons born through ART, the percentage of low-birth-weight infants was higher for those from multiple-fetus pregnancies (about 17%) than those from single-fetus pregnancies (8%). In the general U.S. population, where singletons are almost always the result of a single-fetus pregnancy, 6% of infants born in 2006 (most recent available data) had low birth weights.

Approximately 56% of twins and 92% of triplets or more had low birth weights. Comparing percentages of low birth weight between ART twins and triplets or more and the general population is not meaningful because the vast majority of multiple births in the United States are due to infertility treatments (both ART and non-ART).

These data indicate that the risk for low birth weight is higher for infants conceived through ART than for infants in the general population. The increase in risk is due, in large part, to the higher percentage of multiple-fetus pregnancies resulting from ART cycles.

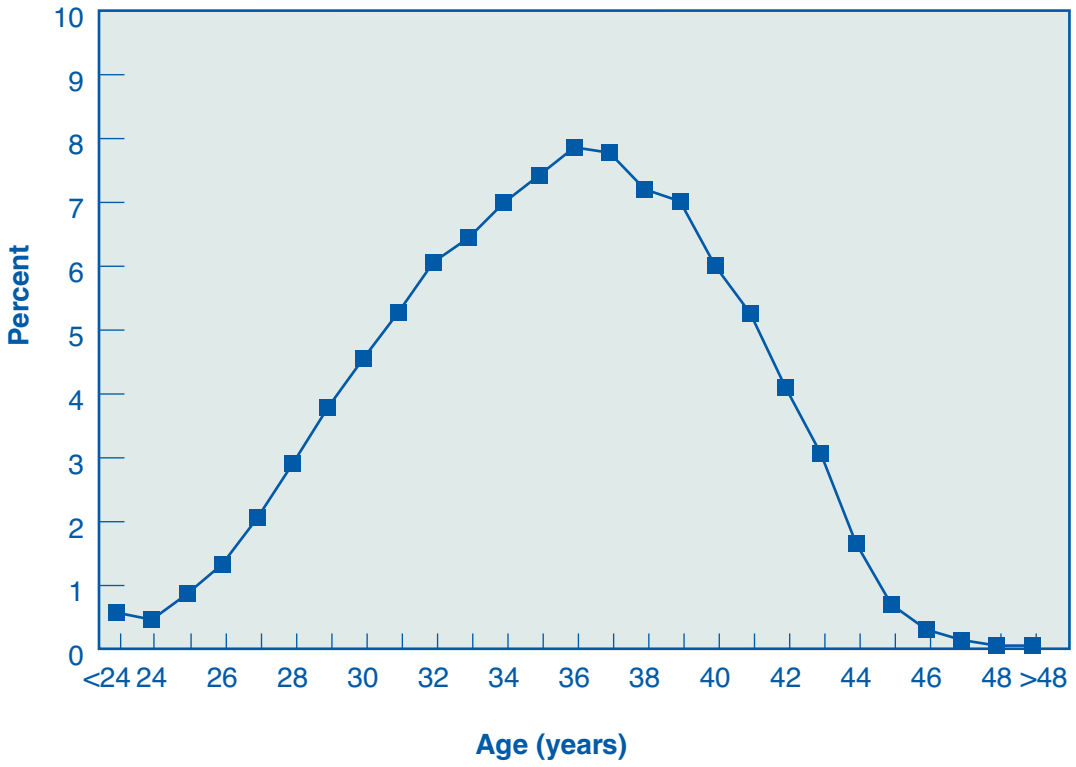
Figure 12
Percentages of Low-Birth-Weight Infants from ART Cycles Using Fresh Nondonor Eggs or Embryos, by Number of Infants Born, 2007



What are the ages of women who use ART?

Figure 13 presents ART cycles using fresh nondonor eggs or embryos according to the age of the woman who had the procedure. About 12% of these cycles were among women younger than age 30, about 67% were among women aged 30–39, and approximately 21% were among women aged 40 and older.

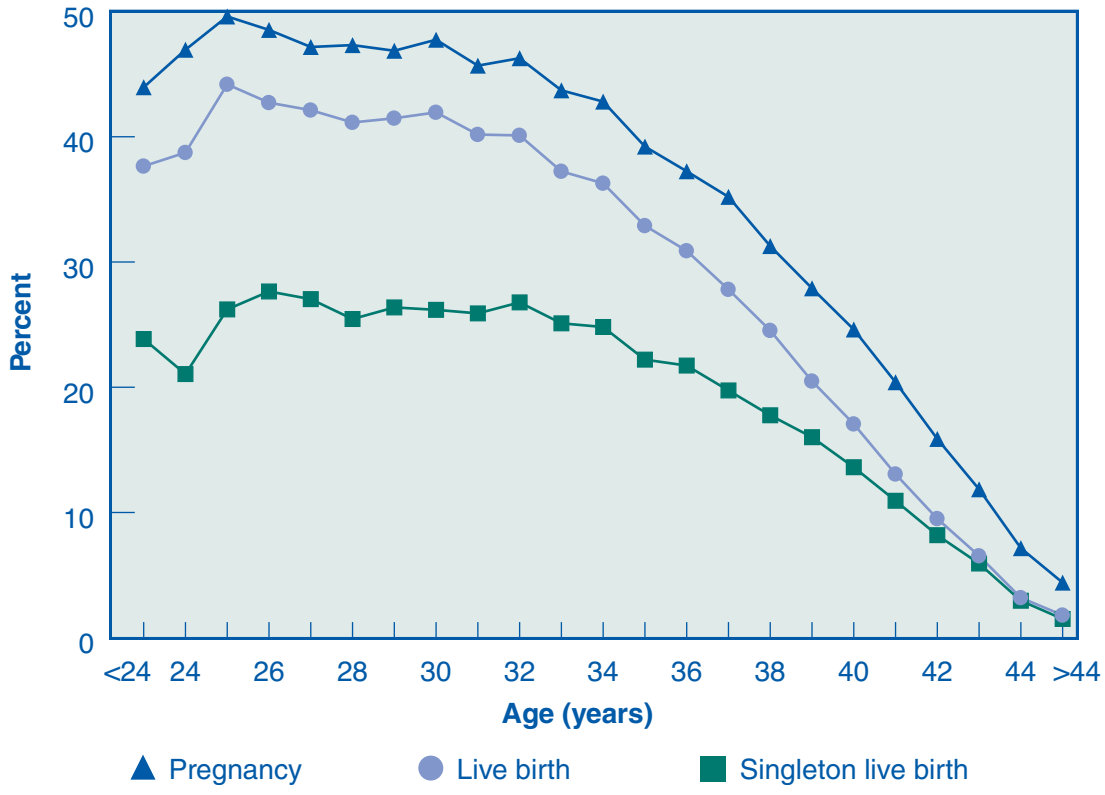
Figure 13
Age Distribution of Women Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos, 2007



Do percentages of ART cycles that result in pregnancies, live births, and singleton live births differ among women of different ages?

A woman's age is the most important factor affecting the chances of a live birth when her own eggs are used. Figure 14 shows percentages of pregnancies, live births, and singleton live births for women of different ages who had ART procedures using fresh nondonor eggs or embryos in 2007. Percentages of ART cycles resulting in live births and singleton live births are different because of the high percentage of multiple-infant deliveries counted among the total live births. The percentage of multiple-infant births is particularly high among women younger than 35 (see Figure 34, page 48). Among women in their 20s, percentages of ART cycles resulting in pregnancies, live births, and singleton live births were relatively stable; however, percentages declined steadily from the mid-30s onward. For additional detail on percentages of ART cycles that resulted in pregnancies, live births, and singleton live births among women aged 40 or older, see Figure 15 on page 29.

Figure 14
Percentages of ART Cycles Using Fresh Nondonor Eggs or Embryos That Resulted in Pregnancies, Live Births, and Singleton Live Births, by Age of Woman,* 2007

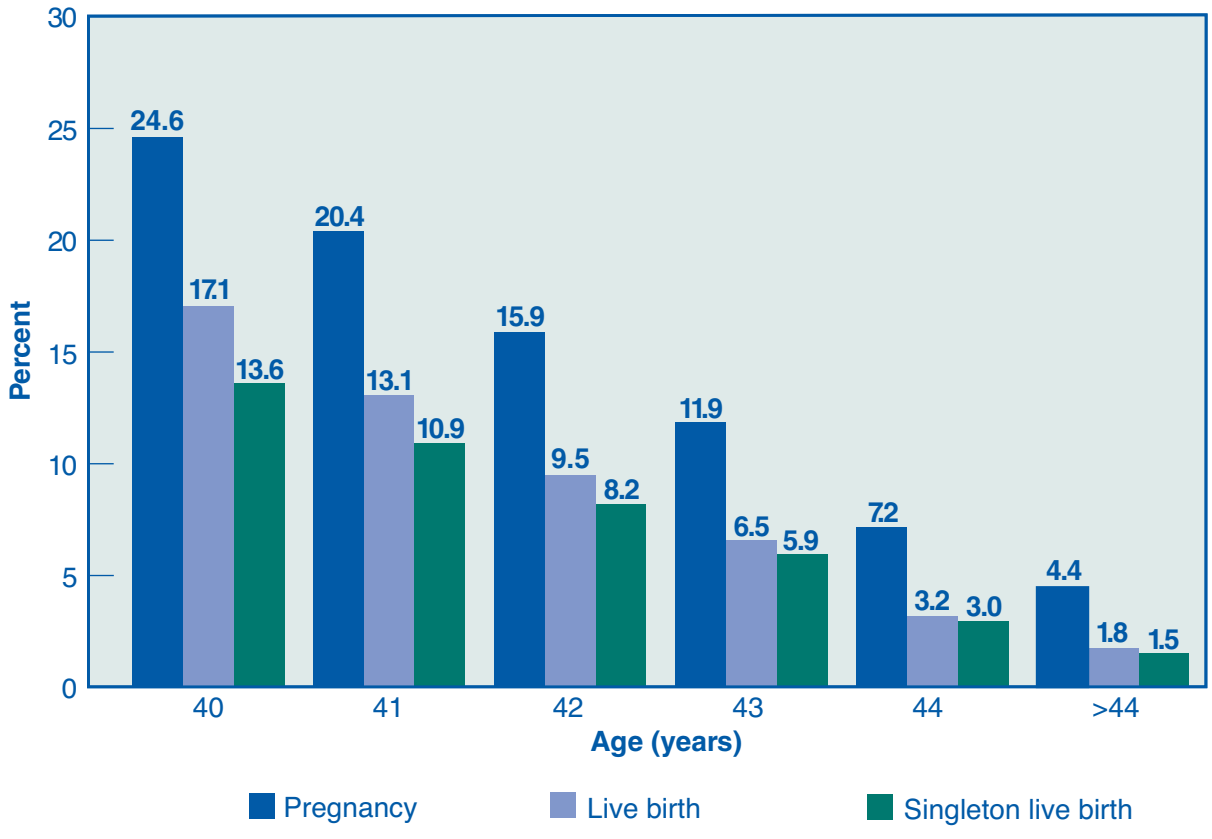


*For consistency, all percentages are based on cycles started.

How do percentages of ART cycles that result in pregnancies, live births, and singleton live births differ for women who are 40 or older?

Percentages of ART cycles that result in pregnancies, live births, and singleton live births decline with each year of age and are particularly low for women 40 or older. Figure 15 shows percentages of pregnancies, live births, and singleton live births in 2007 for women 40 or older who used fresh nondonor eggs or embryos. The average chance for pregnancy was about 25% for women aged 40; the percentage of ART cycles resulting in live births for this age was about 17%, and the percentage of ART cycles resulting in singleton live births was about 14%. All percentages dropped steadily with each 1-year increase in age. For women older than 44, the percentage of live births and singleton live births were both close to 2%. Women 40 or older generally have much higher percentages of live births using donor eggs (see Figure 45, page 59).

Figure 15
Percentages of ART Cycles Using Fresh Nondonor Eggs or Embryos That Resulted in Pregnancies, Live Births, and Singleton Live Births Among Women Aged 40 or Older,* 2007



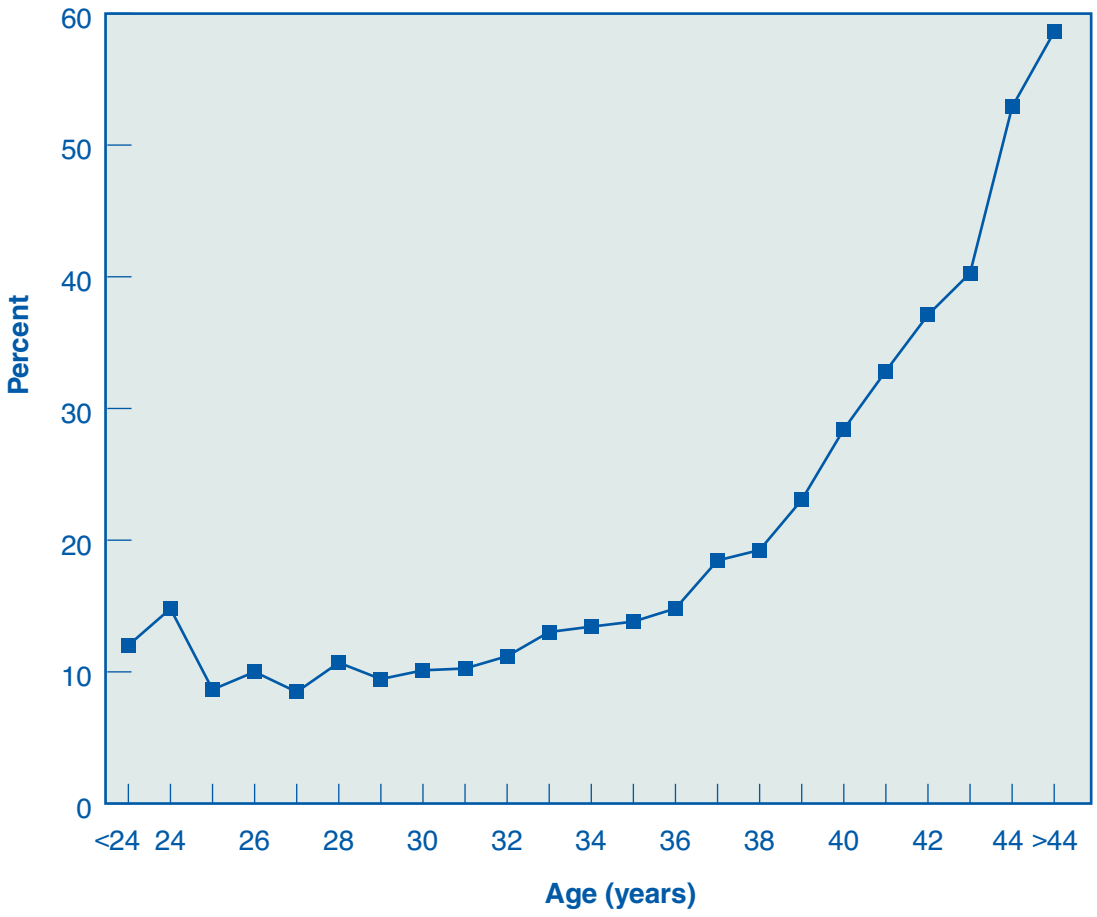
*For consistency, all percentages are based on cycles started.

How does the risk for miscarriage differ among women of different ages?

A woman's age not only affects the chance for pregnancy when her own eggs are used, but also affects her risk for miscarriage. Figure 16 shows percentages of ART cycles started in 2007 that resulted in miscarriage for women of different ages. Percentages of ART cycles that resulted in miscarriage were below 14% among women younger than 35. The percentage of ART cycles that resulted in miscarriages began to increase among women in their mid- to late 30s and continued to increase with age, reaching 28% at age 40 and almost 59% among women older than 44.

The risk for miscarriage observed among women undergoing ART procedures using fresh nondonor eggs or embryos appear to be similar to those reported in various studies of other pregnant women in the United States.

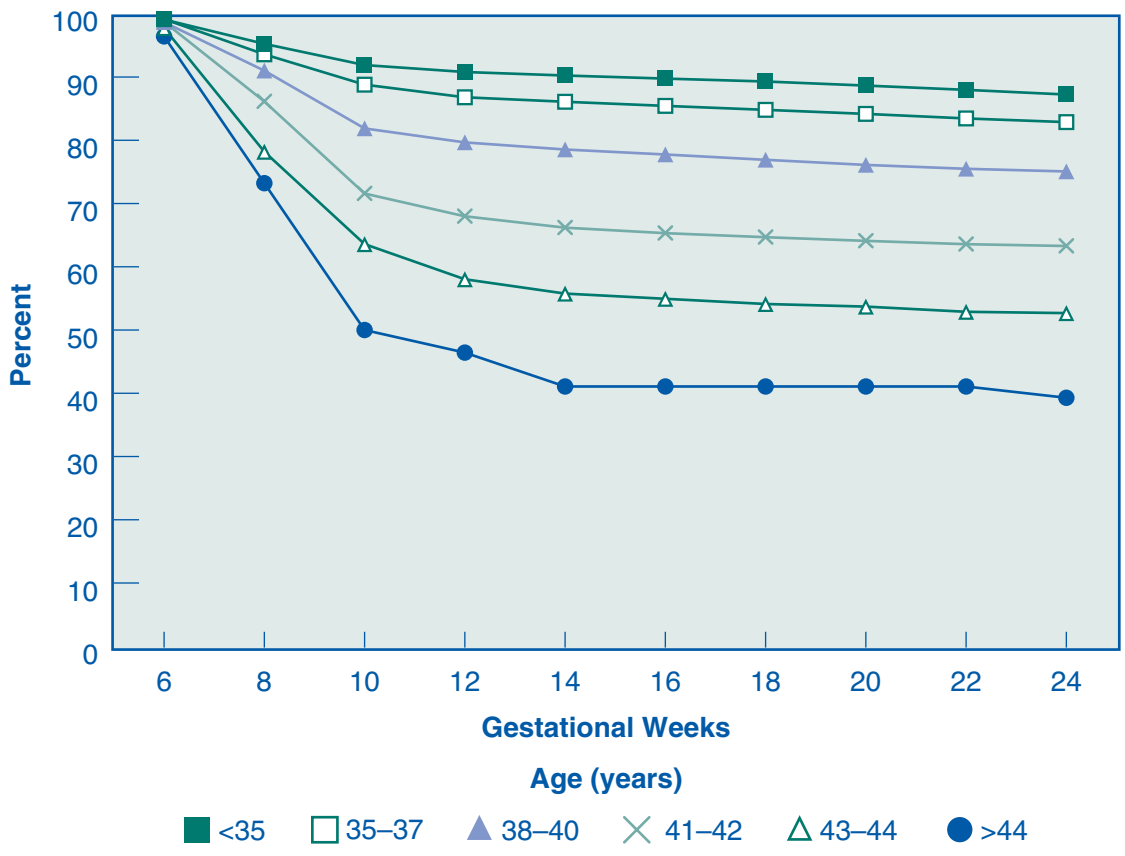
Figure 16
Percentages of ART Cycles Using Fresh Nondonor Eggs or Embryos That Resulted in Miscarriage, by Age of Woman, 2007



How does the risk for pregnancy loss vary during pregnancy (through week 24) among women of different ages?

A woman's risk for pregnancy loss (loss of an entire pregnancy, or all fetuses in a multiple-fetus pregnancy) is affected by the duration of her pregnancy and her age. Figure 17 shows that between 13% and 61% of clinically-detected pregnancies (clinical detection through ultrasound performed between 4 and 6 weeks after the day of embryo transfer) are lost at some later point during the pregnancy, depending on the woman's age. Among women younger than 35, 13% of pregnancies were lost and 87% continued through week 24. In contrast, among women older than 44, 61% of pregnancies were lost and only 39% continued through week 24. In all age groups, most pregnancy losses occurred before week 14 (i.e., during the first trimester). The risk of pregnancy loss after 24 weeks was less than 1% for all age groups because most pregnancies that progress beyond week 24 lead to live births.

Figure 17
Percentages of Pregnancies That Continued Past a Given Gestational Week Among Women Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos, by Age of Woman, 2007



How does a woman's age affect her chances of progressing through the various stages of ART?

In 2007, a total of 101,897 cycles using fresh nondonor eggs or embryos were started:

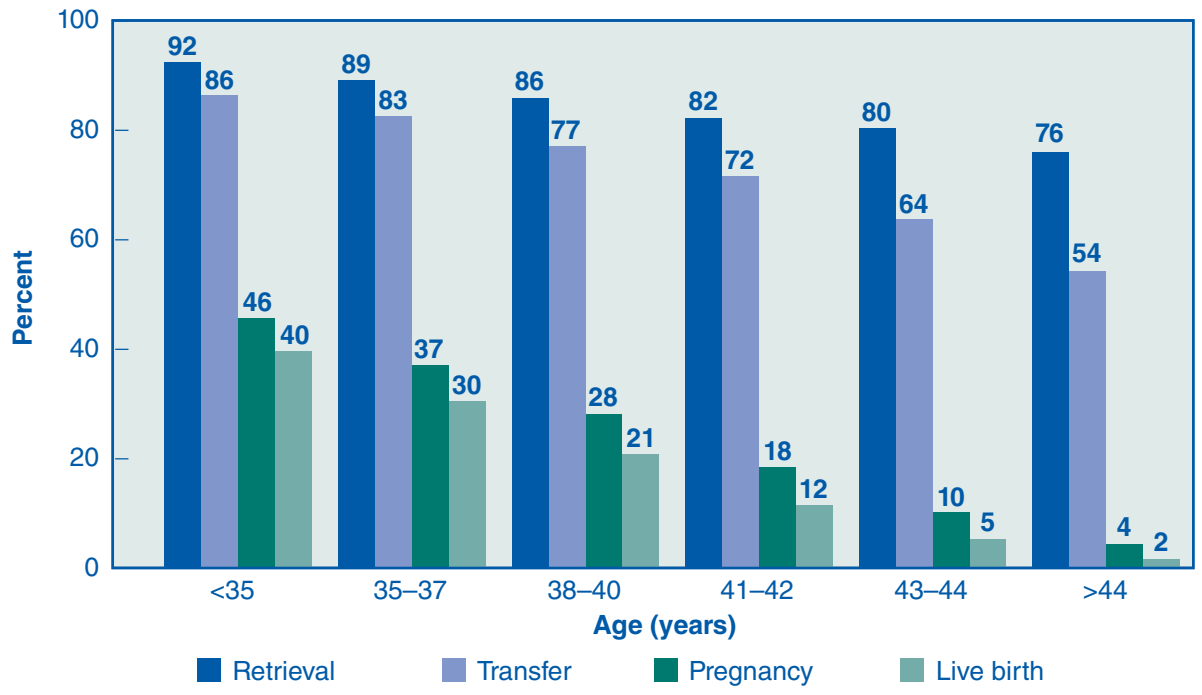
- 42,127 in women younger than 35
- 23,504 in women 35–37
- 20,612 in women 38–40
- 9,535 in women 41–42
- 4,814 in women 43–44
- 1,305 in women older than 44

Figure 18 shows that a woman's chance of progressing from the beginning of ART to pregnancy and live birth (using her own eggs) decreases at every stage of ART as her age increases.

- As women get older, the likelihood of a successful response to ovarian stimulation and progression to **egg retrieval** decreases.
- As women get older, cycles that have progressed to egg retrieval are slightly less likely to reach **transfer**.
- The percentage of cycles that progress from transfer to **pregnancy** also decreases as women get older.
- As women get older, cycles that have progressed to pregnancy are less likely to result in a **live birth** because the risk for miscarriage is greater (see Figure 16, page 30).

Overall, 40% of cycles started in 2007 among women younger than 35 resulted in live births. This percentage decreased to 30% among women 35–37 years of age, 21% among women 38–40, 12% among women 41–42, 5% among women 43–44, and 2% among women older than 44.

Figure 18
Outcomes of ART Cycles Using Fresh Nondonor Eggs or Embryos, by Stage and Age Group, 2007

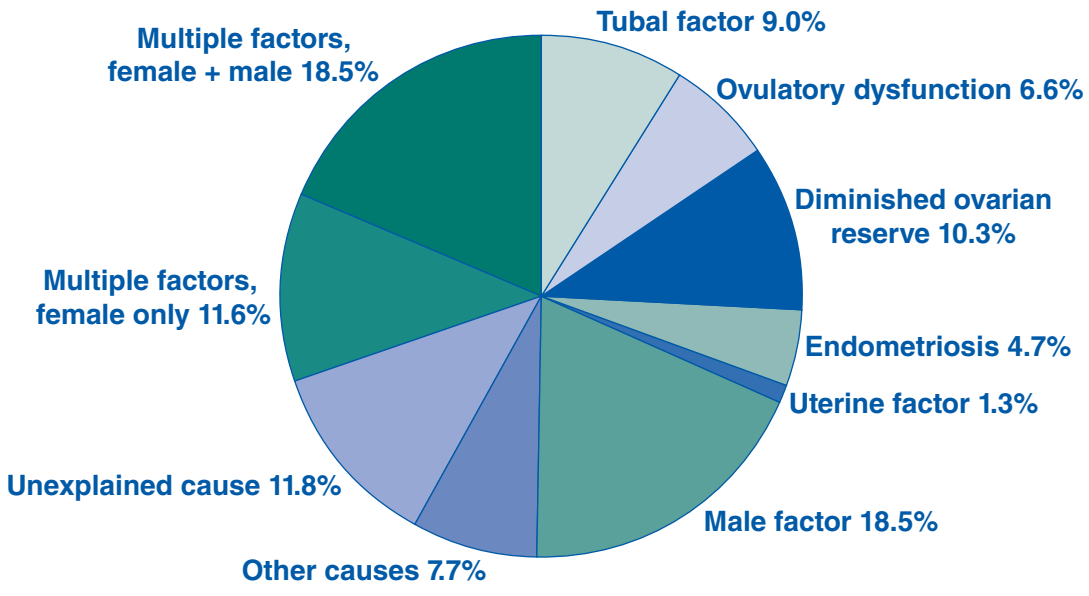


What are the causes of infertility among couples who use ART?

Figure 19 shows the infertility diagnoses reported among couples who had an ART procedure using fresh nondonor eggs or embryos in 2007. Diagnoses range from one infertility factor in one partner to multiple factors in either one or both partners. However, diagnostic procedures may vary from one clinic to another, so the categorization also may vary.

- **Tubal factor** means that the woman's fallopian tubes are blocked or damaged, making it difficult for the egg to be fertilized or for an embryo to travel to the uterus.
- **Ovulatory dysfunction** means that the ovaries are not producing eggs normally. Such dysfunctions include polycystic ovary syndrome and multiple ovarian cysts.
- **Diminished ovarian reserve** means that the ability of the ovary to produce eggs is reduced. Reasons include congenital, medical, or surgical causes or advanced age.
- **Endometriosis** involves the presence of tissue similar to the uterine lining in abnormal locations. This condition can affect both fertilization of the egg and embryo implantation.
- **Uterine factor** means a structural or functional disorder of the uterus that results in reduced fertility.
- **Male factor** refers to a low sperm count or problems with sperm function that make it difficult for a sperm to fertilize an egg under normal conditions.
- **Other causes** of infertility include immunological problems, chromosomal abnormalities, cancer chemotherapy, and serious illnesses.
- **Unexplained cause** means that no cause of infertility was found in either the woman or the man.
- **Multiple factors, female only,** means that more than one female cause was diagnosed.
- **Multiple factors, female and male,** means that one or more female causes and male factor infertility were diagnosed.

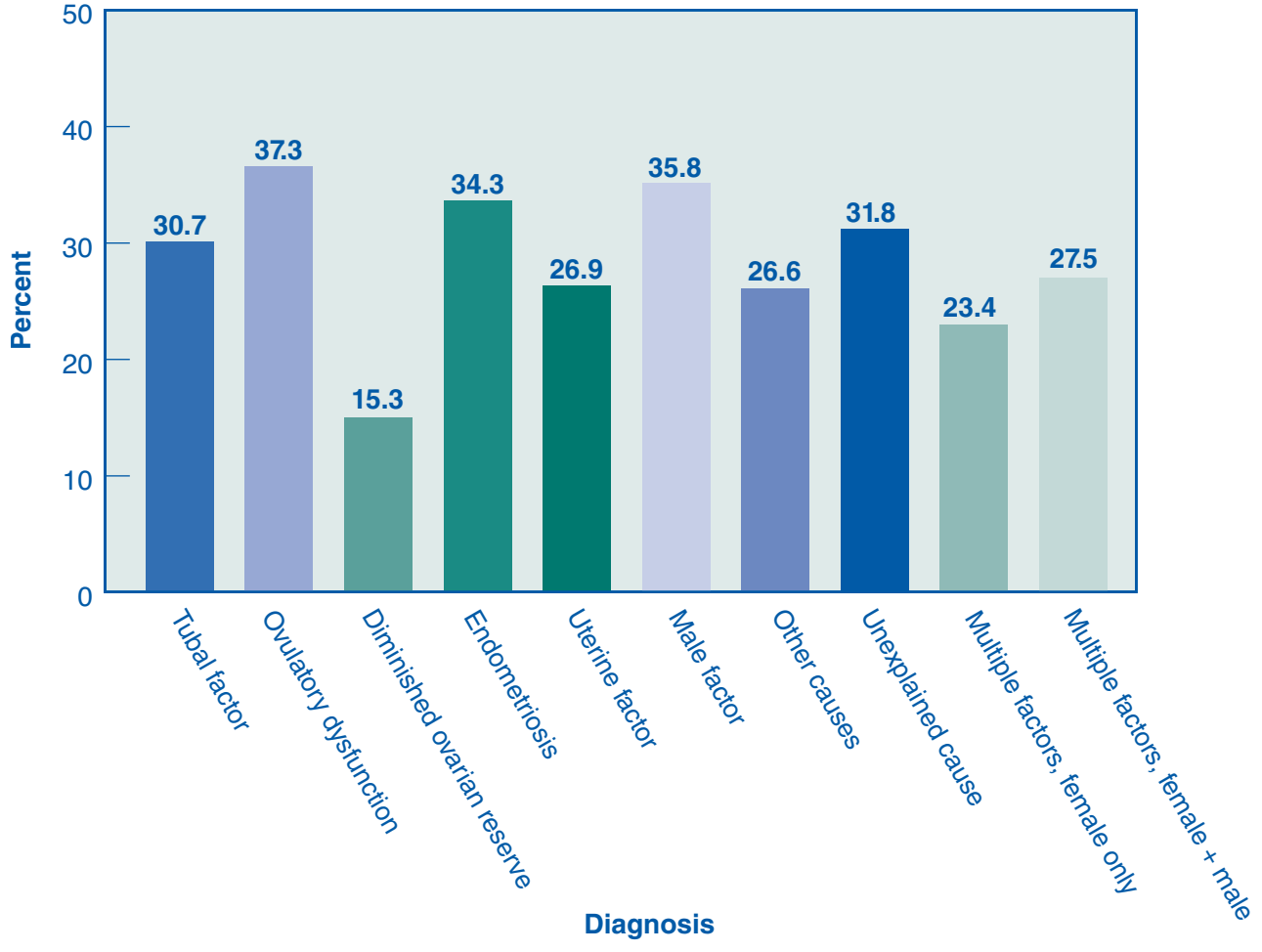
Figure 19
Diagnoses Among Couples Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos, 2007



Does the cause of infertility affect the percentage of ART cycles that result in live births?

Figure 20 shows the percentage of ART cycles that resulted in live births according to the causes of infertility. (See Figure 19, page 33, or the Glossary in Appendix B for an explanation of the diagnoses.) Although the national average was about 29% (see Figure 7, page 21), the percentage of ART cycles that resulted in live births varied somewhat depending on the couple's diagnosis. In 2007, the percentage of ART cycles resulting in live births was higher than the national average for couples diagnosed with tubal factor, ovulatory dysfunction, endometriosis, male factor, or unexplained infertility; it was lower for couples diagnosed with uterine factor, "other" causes, multiple infertility factors, or diminished ovarian reserve. Please note, however, the definitions of infertility diagnoses may vary from clinic to clinic and that a review of select clinical records revealed that reporting of infertility causes may be incomplete. (See Findings from Validation Visits for 2007 ART Data in Appendix A for additional information.) Therefore, differences in success rates by causes of infertility should be interpreted with caution.

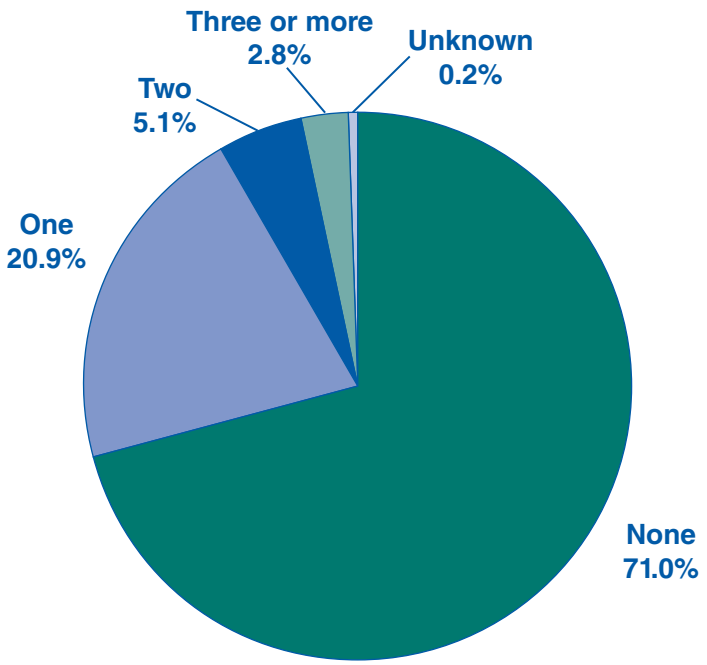
Figure 20
Percentages of ART Cycles Using Fresh Nondonor Eggs or Embryos That Resulted in Live Births, by Diagnosis, 2007



How many women who use ART have previously given birth?

Figure 21 shows the number of previous births among women who had an ART procedure using fresh nondonor eggs or embryos in 2007. Most of these women (71%) had no previous births, although they may have had a pregnancy that resulted in a miscarriage or an induced abortion. About 21% of women using ART in 2007 reported one previous birth, and about 8% reported two or more previous births. However, we do not have information about how many of these were ART births and how many were not. These data nonetheless point out that women who have previously had children can still face infertility problems.

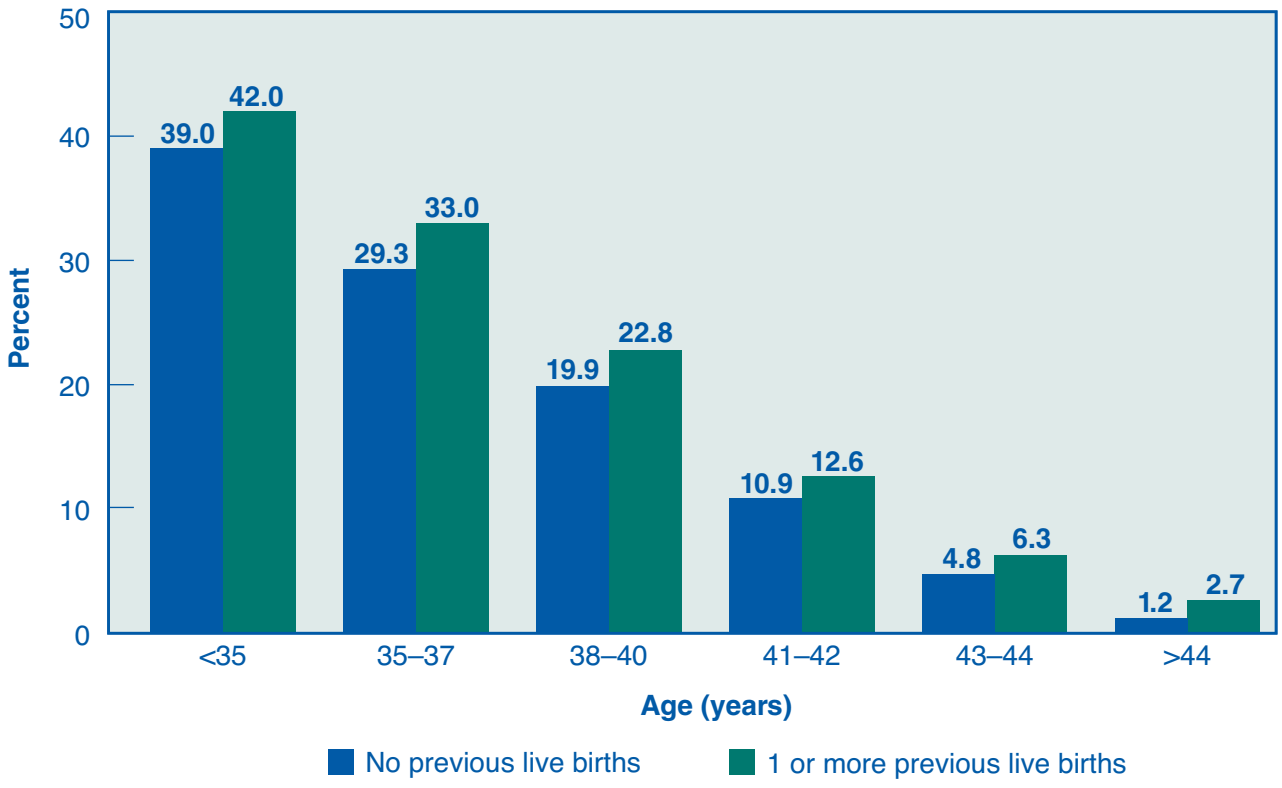
Figure 21
Number of Previous Births Among Women Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos, 2007



Do women who have previously given birth have higher percentages of ART cycles that result in live births?

Figure 22 shows the relationship between the success of an ART cycle and the woman's history of previous births. Previous live-born infants were conceived naturally in some cases and through ART in others. In all age groups, women who had a previous live birth were more likely to have a successful ART procedure.

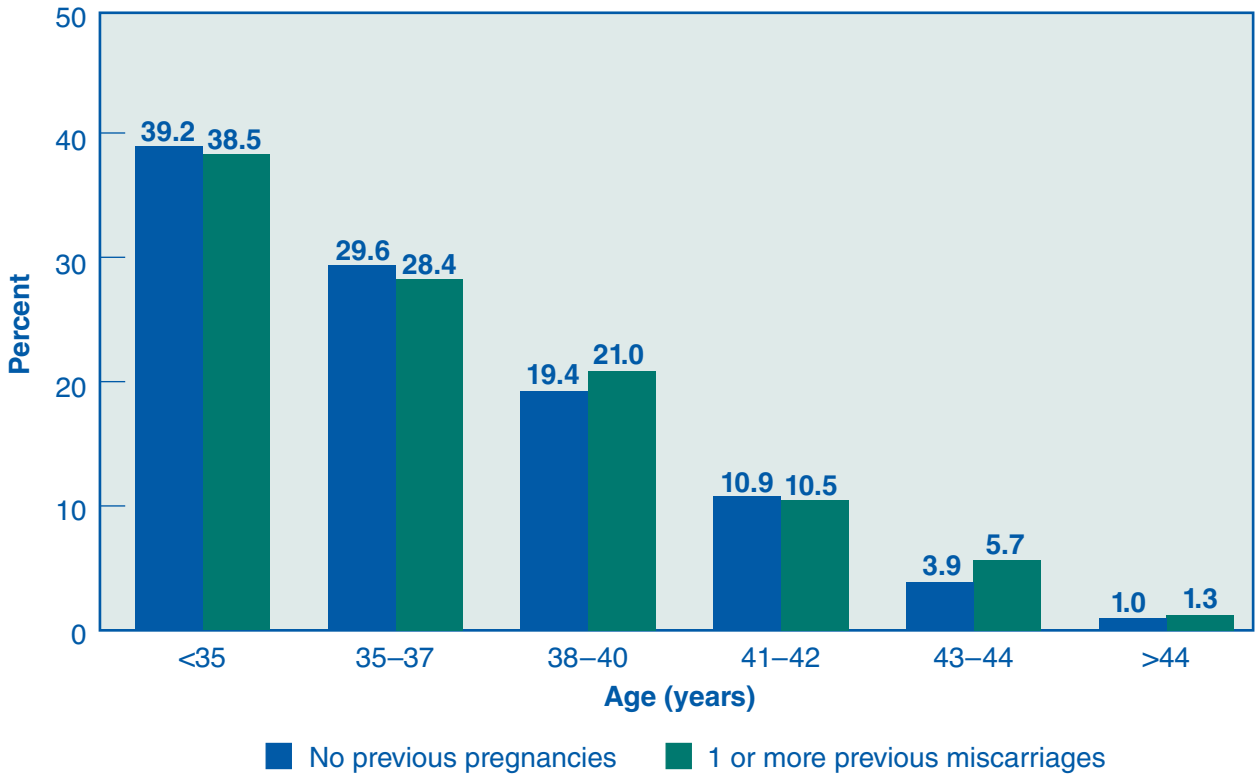
Figure 22
Percentages of ART Cycles Using Fresh Nondonor Eggs or Embryos That Resulted in Live Births, by Woman's Age and Number of Previous Live Births, 2007



Is there a difference in percentages of ART cycles that result in live births between women with previous miscarriages and women who have never been pregnant?

In 2007, 72,337 ART cycles were performed among women who had not previously given birth. However, about 27% of those cycles were reported by women with one or more previous pregnancies that had ended in miscarriage—we do not have information on whether these pregnancies ending in miscarriage were the result of ART or were conceived naturally. Figure 23 shows the relationship between the success of an ART cycle and the history of previous miscarriage. In all age groups, women who had a previous miscarriage were about as likely to have a live birth as women who had never been pregnant. Thus, a history of unsuccessful pregnancy does not appear to be associated with lower chances for success during ART.

Figure 23
Percentages of ART Cycles Using Fresh Nondonor Eggs or Embryos That Resulted in Live Births, by Woman's Age and History of Miscarriage, Among Women with No Previous Births,* 2007

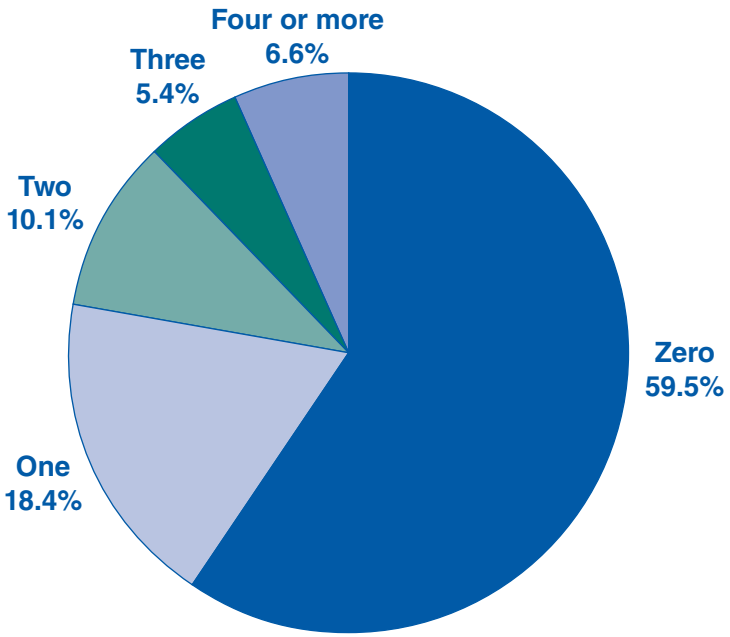


*Women reporting only previous ectopic pregnancies or pregnancies that ended in induced abortion were not included in the above statistics.

How many current ART users have undergone previous ART cycles?

Figure 24 presents ART cycles that used fresh nondonor eggs or embryos in 2007 according to whether previous ART cycles had been performed. For about 40%, one or more previous cycles were reported. (This percentage includes previous cycles using either fresh or frozen embryos.) This finding illustrates that it is not uncommon for women to undergo multiple ART cycles. We do not have information on when previous cycles were performed, nor do we have information on the outcomes of those previous cycles.

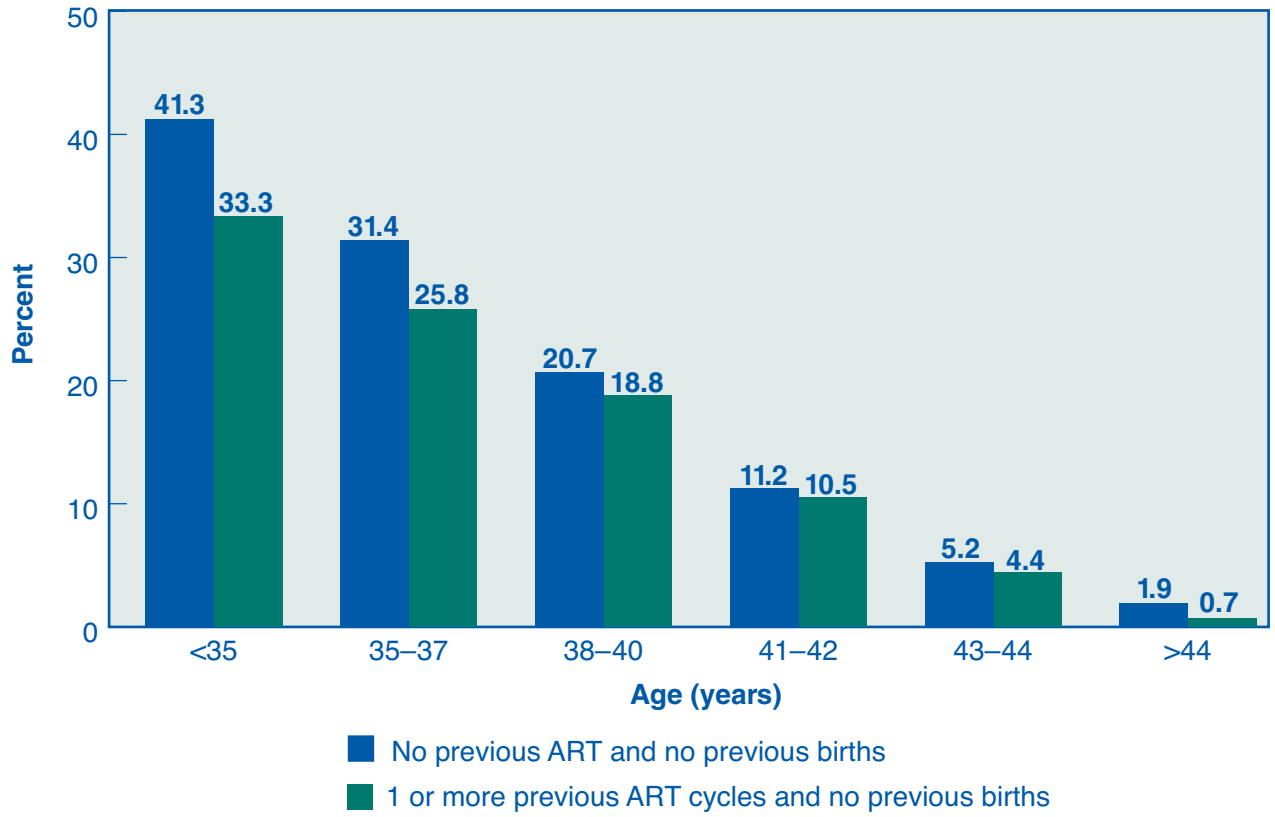
Figure 24
Number of Previous ART Cycles Among Women Undergoing ART with Fresh Nondonor Eggs or Embryos, 2007



Are percentages of ART cycles that result in live births different for women using ART for the first time and women who previously used ART but did not give birth?

Figure 25 shows the relationship between the success of ART cycles performed in 2007 using fresh nondonor eggs or embryos and a history of previous ART cycles among women with no previous births. In all age groups, percentages of ART cycles that resulted in live births were lower for women who had previously undergone an unsuccessful ART cycle.

Figure 25
Percentages of ART Cycles Using Fresh Nondonor Eggs or Embryos That Resulted in Live Births, by Woman's Age and History of Previous ART Cycles, Among Women with No Previous Births, 2007

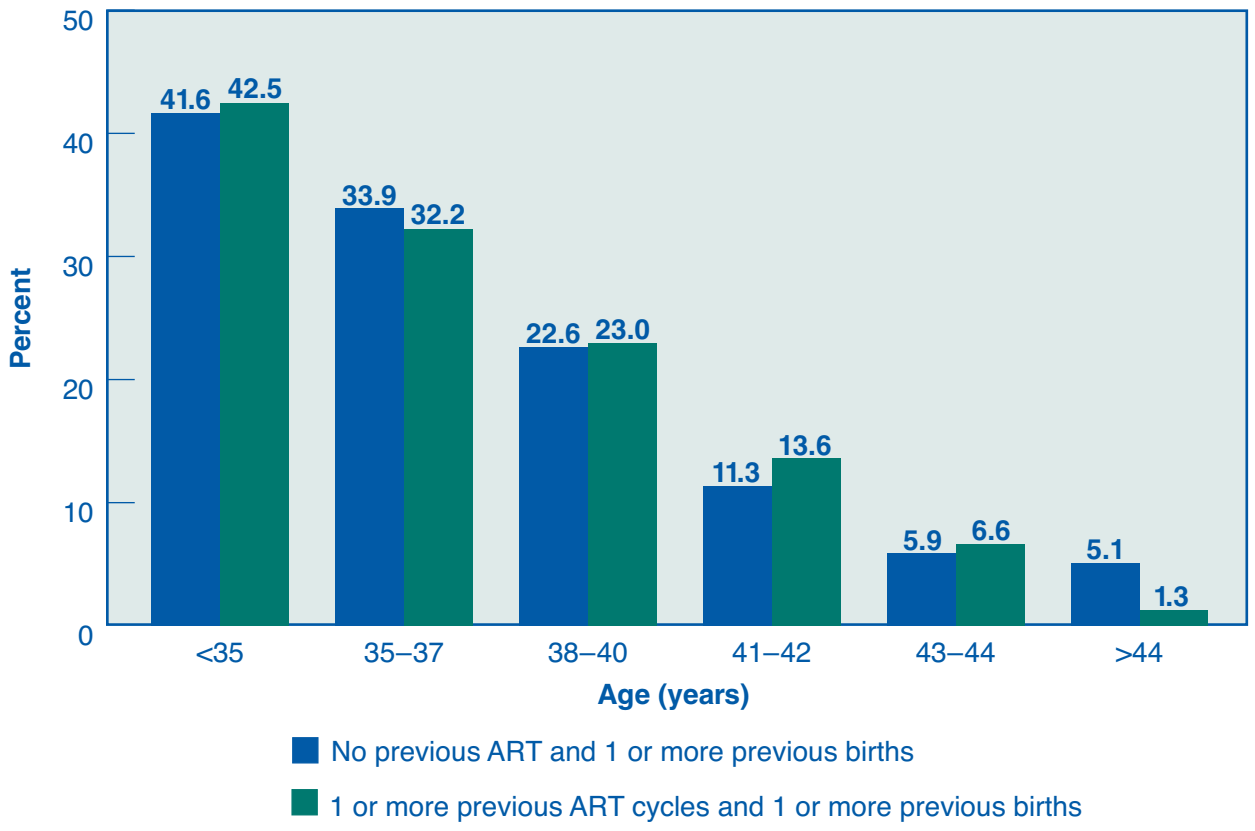


What is the percentage of ART cycles that result in live births for women who have had both previous ART and previous births?

Figure 26 shows the relationship between the success of ART cycles performed in 2007 using fresh nondonor eggs or embryos and a history of both previous ART cycles and previous births. We do not have information on whether the previous births were the result of ART or were conceived naturally. However, among women with previous births, percentages of ART cycles that resulted in live births among women who did not undergo a previous ART procedure were comparable to percentages among women who had undergone previous ART cycles, except for women with advanced age over 44.

Although Figure 25 (see page 39) shows that having undergone previous ART cycles may be related to the success of the current ART cycle, it is also important to consider the outcomes of previous cycles and whether the woman has given birth in the past, as demonstrated in this figure.

Figure 26
Percentages of ART Cycles Using Fresh Nondonor Eggs or Embryos That Resulted in Live Births, by Woman's Age and History of Previous ART Cycles, Among Women with One or More Previous Births, 2007



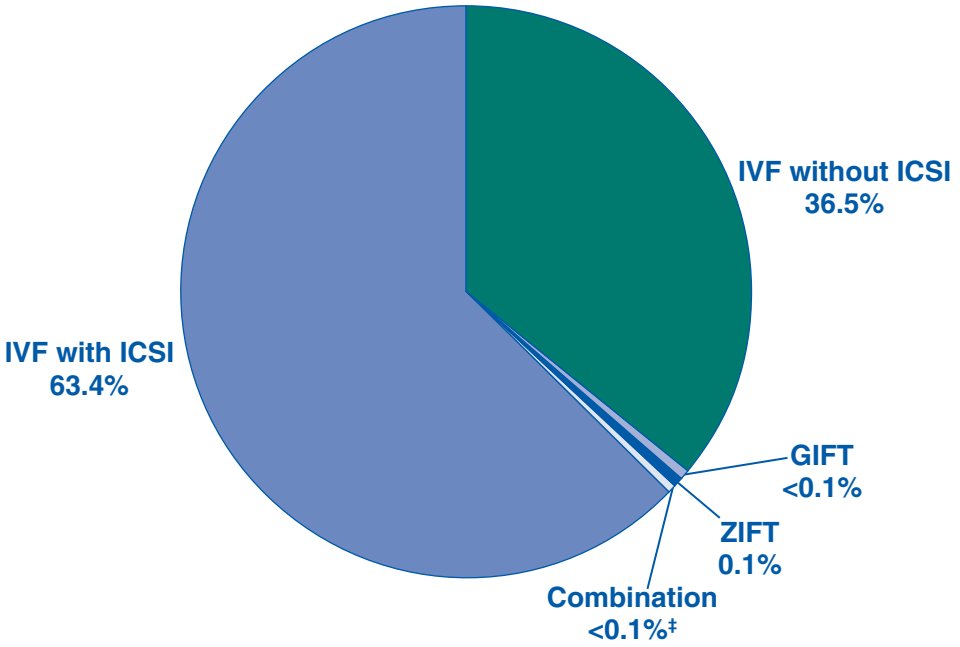
What were the specific types of ART performed among women who used fresh nondonor eggs or embryos in 2007?

For about 37% of ART procedures that used fresh nondonor eggs or embryos in 2007, standard IVF (in vitro fertilization) techniques were used: eggs and sperm were combined in the laboratory, the resulting embryos were cultured for 2 or more days, and one or more embryos were then transferred into the woman's uterus through the cervix.

For most of the remaining ART procedures (about 63%), fertilization was accomplished using intracytoplasmic sperm injection (ICSI). This technique involves injecting a single sperm directly into an egg; the embryos are then cultured and transferred as in standard IVF.

For a small proportion of ART procedures, unfertilized eggs and sperm (gametes) or early embryos (zygotes) were transferred into the woman's fallopian tubes. These procedures are known as gamete and zygote intrafallopian transfer (GIFT and ZIFT). Some women with tubal infertility are not suitable candidates for GIFT and ZIFT. GIFT and ZIFT are more invasive procedures than IVF because they involve inserting a laparoscope into a woman's abdomen to transfer the embryos or gametes into the fallopian tubes. In contrast, IVF involves transferring embryos or gametes into a woman's uterus through the cervix without surgery.

Figure 27
Types of ART Procedures Using Fresh Nondonor Eggs or Embryos,*† 2007

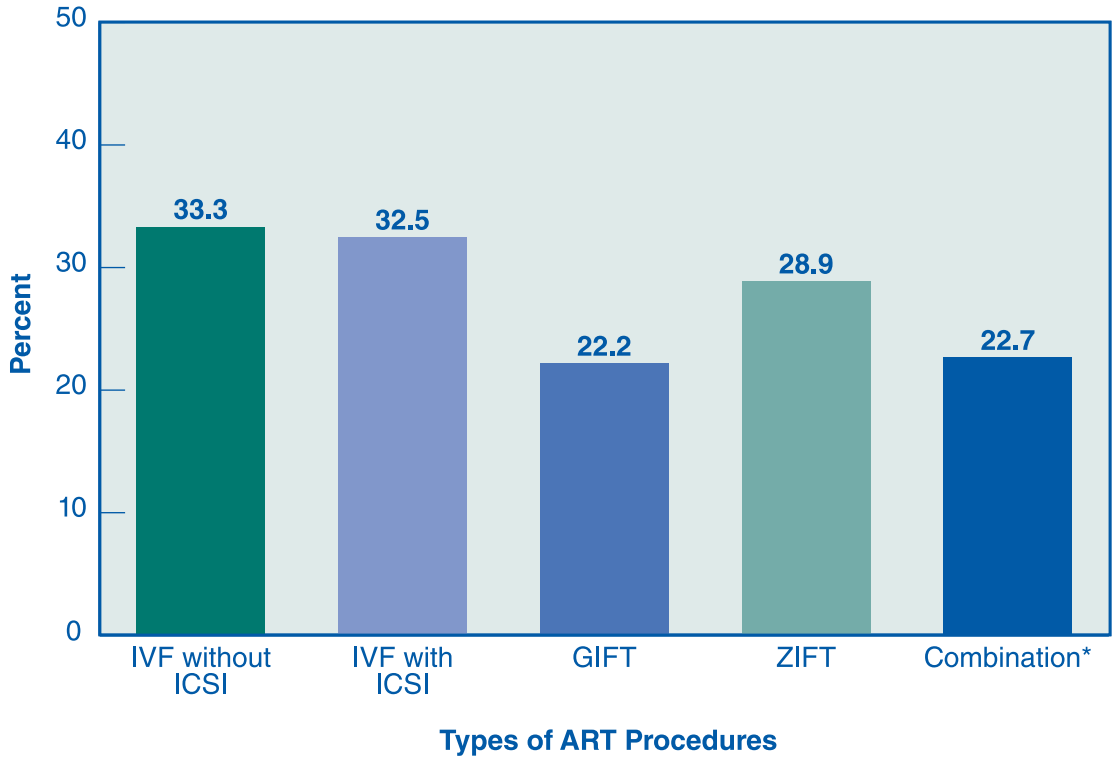


* Cycles that were canceled before egg retrieval were classified as IVF, GIFT, or ZIFT based on the intended ART method.
† Total does not equal 100% due to rounding.
‡ Combination of IVF with or without ICSI and either GIFT or ZIFT.

What is the percentage of egg retrievals that result in live births for different types of ART procedures?

Figure 28 shows the percentage of egg retrievals that resulted in a live birth for each type of ART procedure started in 2007. Percentages for the two predominant types of ART, IVF without ICSI and IVF with ICSI, were similar. Percentages of egg retrievals that resulted in live births for cycles that used GIFT, ZIFT, or a combination of IVF were lower than for cycles that used other ART procedures. See Figures 29–31 (pages 43–45) and Figures 50–55 (pages 64–69) for further details on IVF procedures that used ICSI.

Figure 28
Percentages of Egg Retrievals That Resulted in Live Births, by Type of ART Procedure, 2007

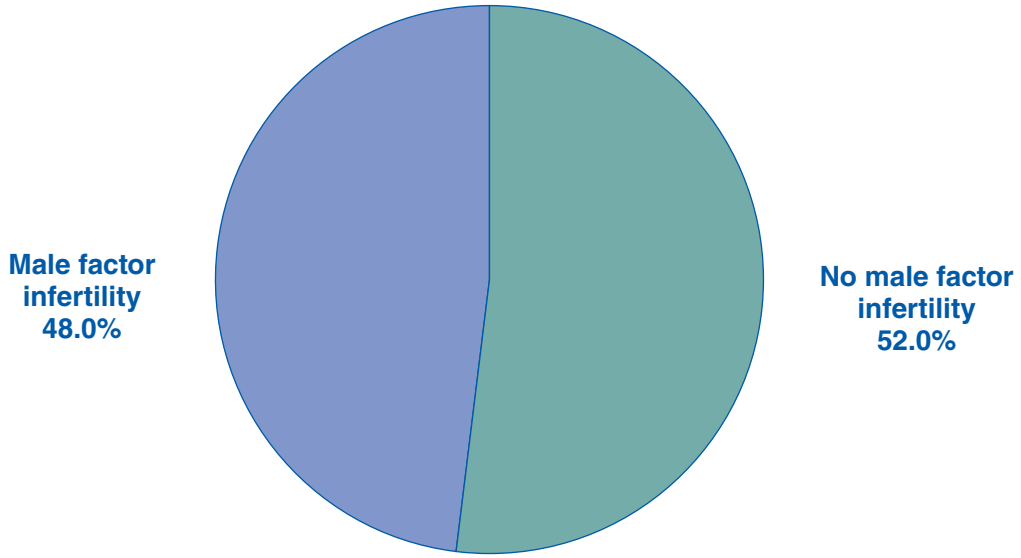


* Combination of IVF with or without ICSI and either GIFT or ZIFT.

Is ICSI used only for couples diagnosed with male factor infertility?

ICSI was developed to overcome problems with fertilization that sometimes occur in couples diagnosed with male factor infertility. In 2007, 64,554 ICSI cycles were performed. Slightly less than half of the ICSI cycles were performed for couples with a diagnosis of male factor infertility. However, diagnostic procedures may vary from one clinic to another, so the categorization of causes of infertility may also vary.

Figure 29
Use of ICSI* in Fresh–Nondonor Cycles Among Couples With and Without Diagnoses of Male Factor Infertility,† 2007



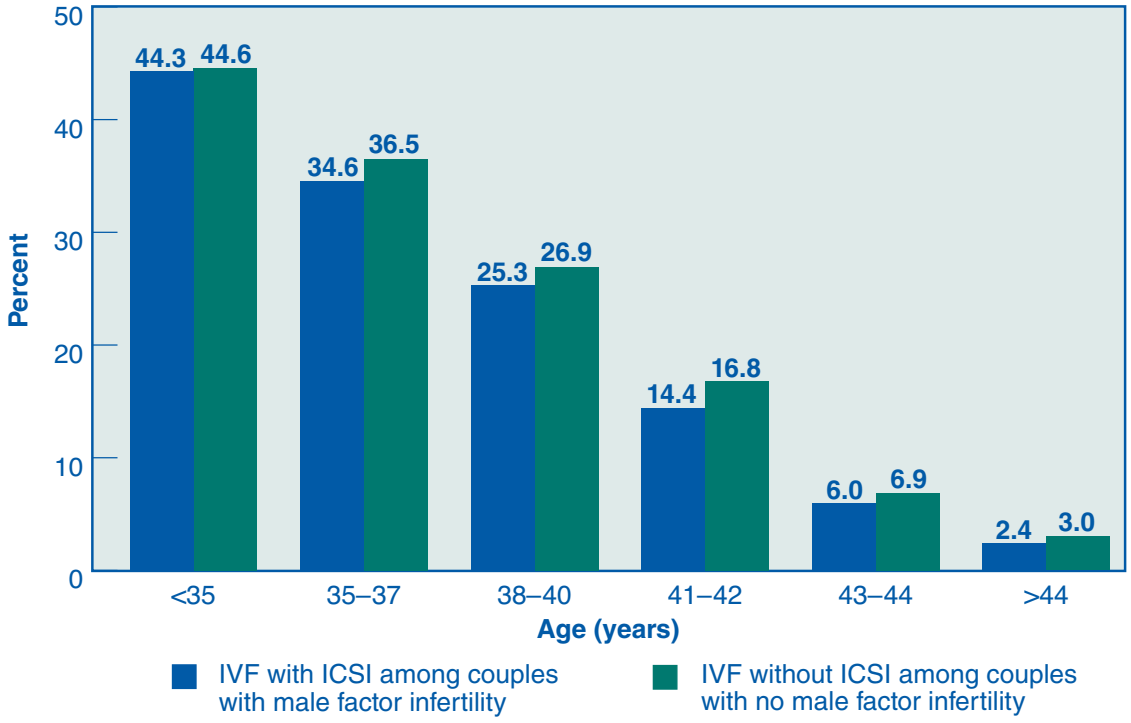
* Intracytoplasmic sperm injection.
† Based on 64,554 cycles that used IVF with ICSI.

What is the percentage of retrievals that result in live births for couples with male factor infertility when ICSI is used?

ICSI was developed to overcome problems with fertilization that sometimes occur among couples diagnosed with male factor infertility. In 2007, 82% of couples diagnosed with male factor infertility used IVF with ICSI. Because ICSI can only be performed when at least one egg has been retrieved, Figure 30 presents percentages of retrievals that resulted in live births for these ICSI procedures among couples diagnosed with male factor infertility. For comparison, these percentages are presented alongside the percentages for ART cycles that used standard IVF without ICSI among couples with all diagnoses except male factor infertility.

For every age group, when ICSI was used for couples diagnosed with male factor infertility, percentages of retrievals that resulted in live births were similar to those achieved by couples who used standard IVF without ICSI and were not diagnosed with male factor infertility. Please note, however, the definitions of infertility diagnoses may vary from clinic to clinic and that a review of select clinical records revealed that reporting of infertility causes may be incomplete. (See Findings from Validation Visits for 2007 ART Data in Appendix A for additional information.) Therefore, differences in success rates by causes of infertility should be interpreted with caution.

Figure 30
Percentages of Retrievals That Resulted in Live Births Among Couples Diagnosed with Male Factor Infertility Who Used IVF with ICSI,* Compared with Couples Not Diagnosed with Male Factor Infertility Who Used IVF Without ICSI, by Woman's Age,† 2007

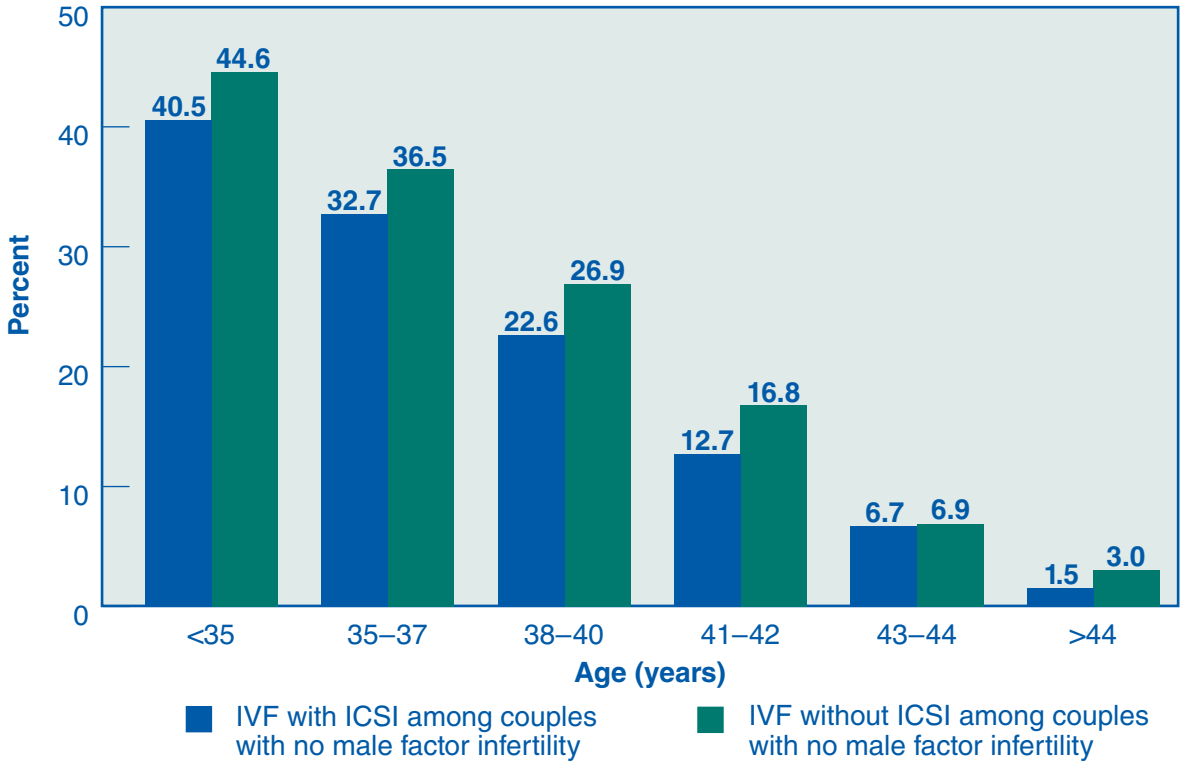


* Intracytoplasmic sperm injection.
† Cycles using donor sperm and cycles using GIFT or ZIFT are excluded.

What is the percentage of retrievals that result in live births for couples without a diagnosis of male factor infertility when ICSI is used?

As shown in Figure 29 (page 43), a large number of ICSI procedures are now performed even when couples are not diagnosed with male factor infertility. Figure 31 presents percentages of egg retrievals that resulted in live births for those cycles compared with ART cycles among couples who used IVF without ICSI. For every age group, the ICSI procedures were less successful. Please note, however, the definitions of infertility diagnoses may vary from clinic to clinic and that a review of select clinical records revealed that reporting of infertility causes may be incomplete. (See Findings from Validation Visits for 2007 ART Data in Appendix A for additional information.) Additionally, information was not available to determine whether this finding was a direct effect of the ICSI procedure or whether the patients who used ICSI were somehow different from those who use IVF alone. Therefore, differences in success rates by causes of infertility should be interpreted with caution.

Figure 31
Percentages of Retrievals That Resulted in Live Births Among Couples Not Diagnosed with Male Factor Infertility, by Use of ICSI* and Woman's Age,† 2007

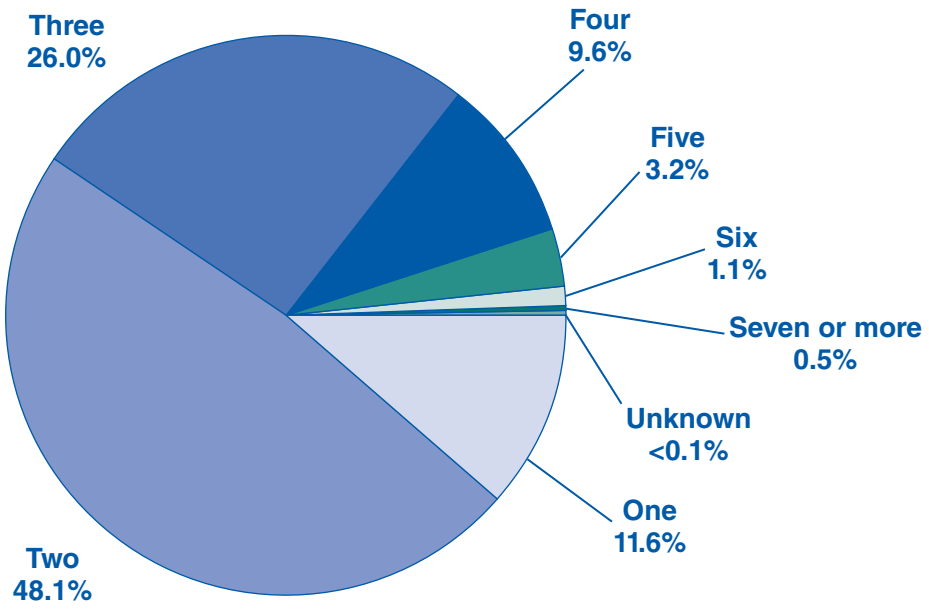


* Intracytoplasmic sperm injection.
† Cycles using donor sperm and cycles using GIFT or ZIFT are excluded.

How many embryos are transferred in an ART procedure?

Figure 32 shows that approximately 40% of ART cycles that used fresh nondonor eggs or embryos and progressed to the embryo transfer stage in 2007 involved the transfer of three or more embryos, about 14% of cycles involved the transfer of four or more, and approximately 5% of cycles involved the transfer of five or more embryos.

Figure 32
Number of Embryos Transferred During ART Cycles Using Fresh Nondonor Eggs or Embryos,* 2007



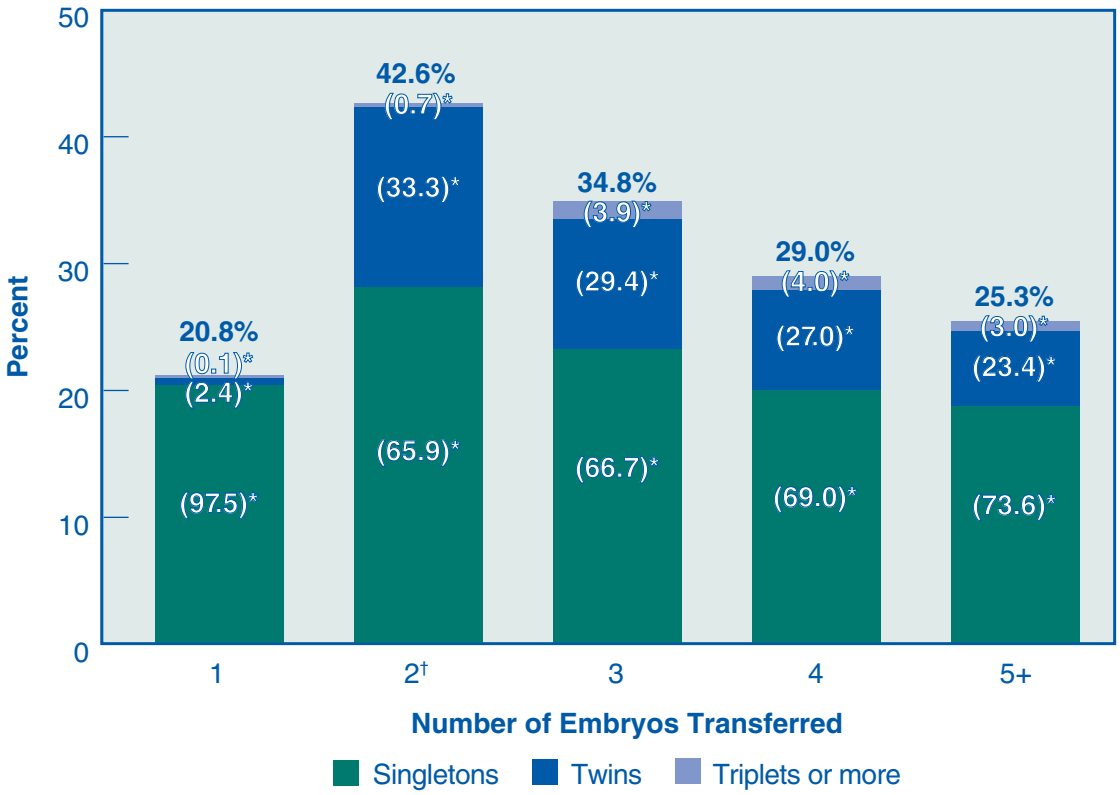
* Total does not equal 100% due to rounding.

In general, is an ART cycle more likely to be successful if more embryos are transferred?

Figure 33 shows the relationship between the number of embryos transferred during an ART procedure in 2007 and the number of infants born alive as a result of that procedure. The percentage of transfers that resulted in live births increased when two or more embryos were transferred; however, transferring multiple embryos also poses a risk of having a multiple-infant birth. Multiple-infant births cause concern because of the additional health risks they create for both mothers and infants. Also, pregnancies with multiple fetuses are potentially subject to multifetal reduction. Multifetal reduction can happen naturally (e.g., fetal death), or a woman or couple may decide to reduce the number of fetuses using a procedure called multifetal pregnancy reduction. Information on multifetal pregnancy reductions is incomplete and therefore is not provided here.

The relationships between number of embryos transferred, percentages of transfers resulting in live births, and multiple-infant births are complicated by several factors, such as the woman's age and embryo quality. See Figure 34 (page 48) for more details on women most at risk for multiple births.

Figure 33
Percentages of Transfers That Resulted in Live Births and Percentages of Multiple-Infant Live Births for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Number of Embryos Transferred, 2007



* Percentages of live births that were singletons, twins, and triplets or more are in parentheses.
Note: In rare cases a single embryo may divide and thus produce twins. For this reason, a small percentage of twins resulted from a single embryo transfer, and a small percentage of triplets resulted when two embryos were transferred.
† Total does not equal 100% due to rounding.

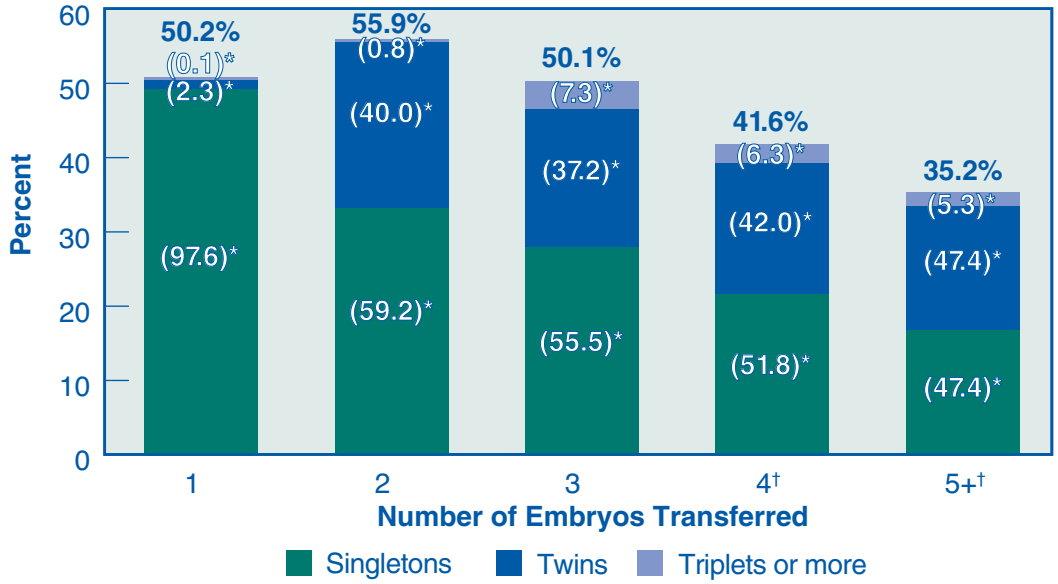
Are percentages of transfers that result in live births affected by the number of embryos transferred for women who have more embryos available than they choose to transfer?

Although, in general, transferring more than one embryo tends to improve the chance for a successful ART procedure (see Figure 33, page 47), other factors are also important. Previous research suggests that the number of embryos fertilized and thus available for ART is just as, if not more, important in predicting success as the number of embryos transferred. Additionally, younger women tend to have both higher percentages of live births and higher likelihood of multiple-infant births. Figure 34 shows the relationship between the number of embryos transferred, percentages of transfers resulting in live births, and multiple-infant births for a subset of ART procedures in which the woman was younger than 35 and the couple chose to set aside some embryos for future cycles rather than transfer all available embryos at one time.

For this group, the chance for a live birth using ART was about 50% when only one embryo was transferred. If one measures success as the percentage of transfers resulting in singleton live births, the highest likelihood of live birth was observed with only one embryo transferred.

The proportion of live births that were multiple-infant births was about 41% with two embryos and about 45% with three embryos. Transferring three or more embryos also created an additional risk for higher-order multiple births (i.e., triplets or more).

Figure 34
Percentages of Transfers That Resulted in Live Births and Percentages of Multiple-Infant Live Births for ART Cycles in Women Who Were Younger Than 35, Used Fresh Nondonor Eggs or Embryos, and Set Aside Extra Embryos for Future Use, by Number of Embryos Transferred, 2007

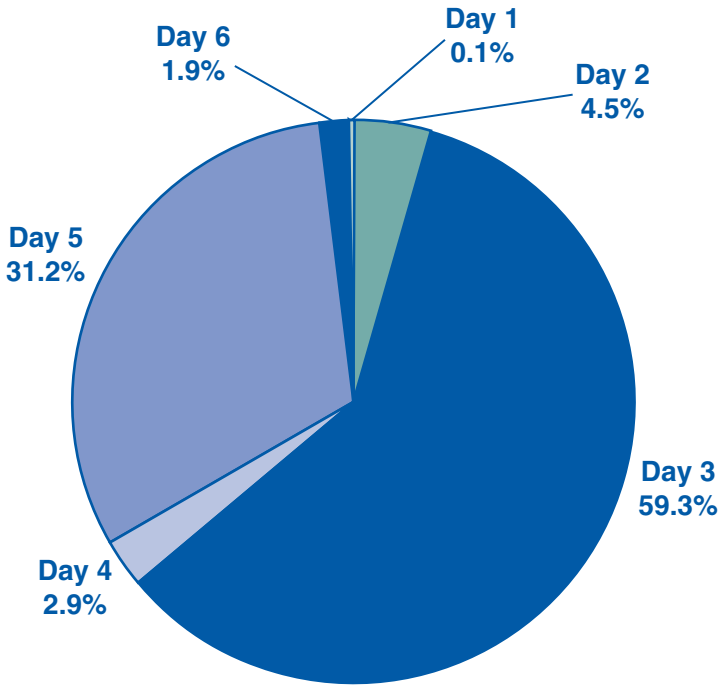


* Percentages of live births that were singletons, twins, and triplets or more are in parentheses.
Note: In rare cases a single embryo may divide and thus produce twins. For this reason, a small percentage of twins resulted from a single embryo transfer, and a small percentage of triplets resulted when two embryos were transferred.
† Totals do not equal 100% due to rounding.

How long after egg retrieval does embryo transfer occur?

Once an ART cycle has progressed from egg retrieval to fertilization, the embryo(s) can be transferred into the woman's uterus in the subsequent 1 to 6 days. Figure 35 shows that in 2007 approximately 59% of embryo transfers occurred on day 3. Day 5 embryo transfers were the next most common, accounting for about 31% of ART procedures that progressed to the embryo transfer stage.

Figure 35
Day of Embryo Transfer* Among ART Cycles Using Fresh Nondonor Eggs or Embryos,†‡ 2007

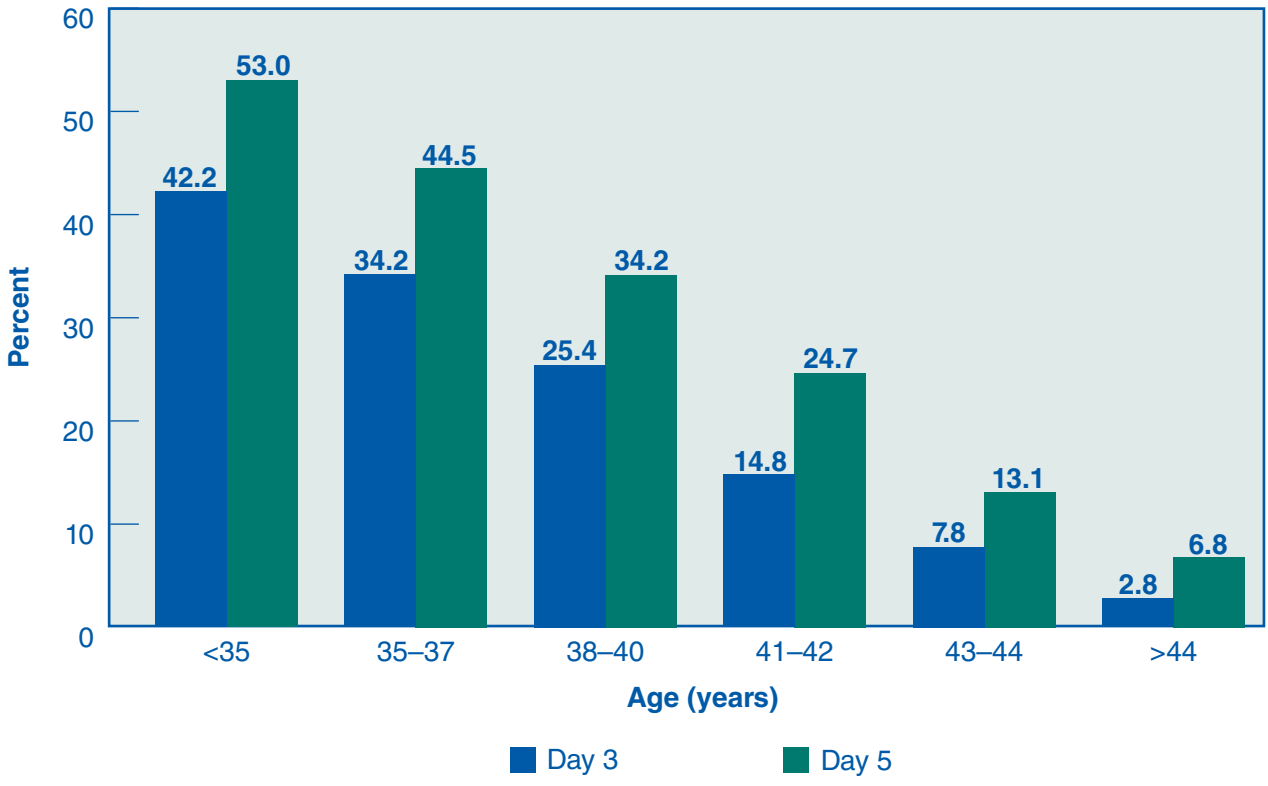


* Number of days following egg retrieval.
† Cycles using GIFT or ZIFT are excluded. Missing or implausible values for day of embryo transfer (i.e., 0 or >6) are not included.
‡ Total does not equal 100% due to rounding.

In general, is an ART cycle more likely to be successful if embryos are transferred on day 5?

As shown in Figure 35 (page 49), in the vast majority of ART procedures, embryos were transferred on day 3 (59%) or day 5 (31%). Figure 36 compares percentages of day 3 embryo transfers that resulted in live births with those for day 5 embryo transfers. In all age groups, percentages were higher for day 5 embryo transfers than for day 3 transfers. However, some cycles do not progress to the embryo transfer stage because of embryo arrest (interruption in embryo development) between day 3 and day 5. These cycles are not accounted for in percentages of day 5 transfers that resulted in live births. Therefore, differences in percentages of day 3 and day 5 transfers that result in live births should be interpreted with caution.

Figure 36
Percentages of Day 3 and Day 5 Embryo Transfers Using Fresh Nondonor Eggs or Embryos That Resulted in Live Births, by Woman's Age,* 2007

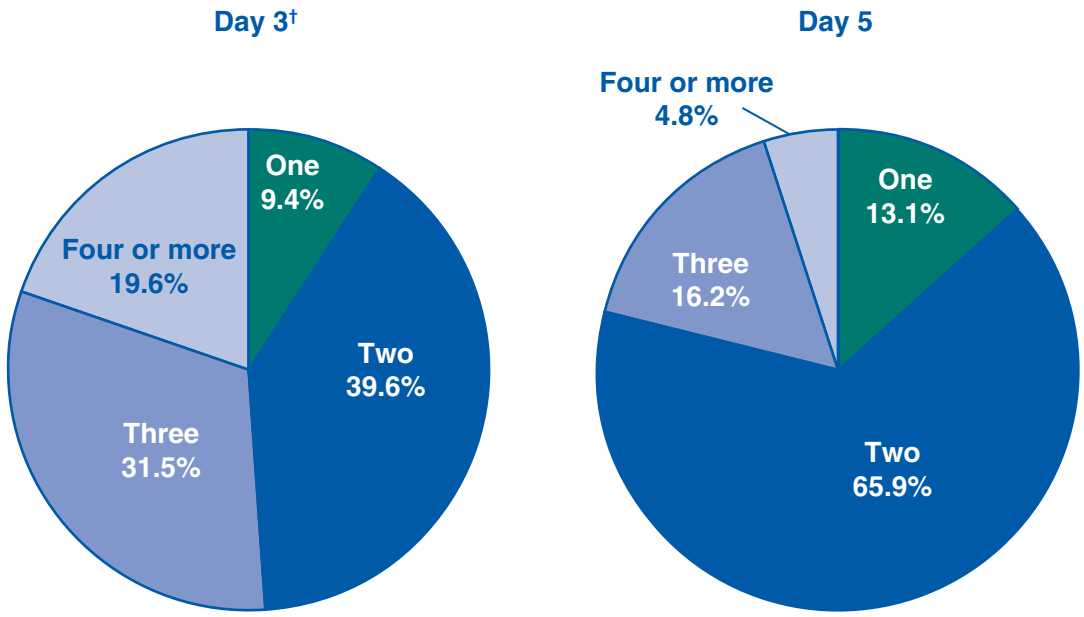


* Cycles using GIFT or ZIFT are excluded. This comparison is limited to transfers on day 3 and day 5. Embryo transfers performed on days 1, 2, 4, and 6 are not included because each of these accounted for a small proportion of procedures.

Does the number of embryos transferred differ for day 3 and day 5 embryo transfers?

Figure 37 shows the number of embryos transferred on day 3 and day 5. Overall, fewer embryos were transferred on day 5 than on day 3. Approximately 51% of day 3 embryo transfers and 21% of day 5 embryo transfers involved the transfer of three or more embryos. The decrease in the number of embryos transferred on day 5; however, did not translate into a lower risk for multiple-infant births. See Figure 38 (page 52) for more details on the relationship between multiple-infant birth risk and day of embryo transfer.

Figure 37
Number of Embryos Transferred During ART Cycles Using Fresh Nondonor Eggs or Embryos for Day 3 and Day 5 Embryo Transfers,* 2007



* Cycles using GIFT or ZIFT are excluded. This comparison is limited to transfers on day 3 and day 5. Embryo transfers performed on days 1, 2, 4, and 6 are not included because each of these accounted for a small proportion of procedures.
† Total does not equal 100% due to rounding.

In general, how does the multiple-infant birth risk vary by the day of embryo transfer?

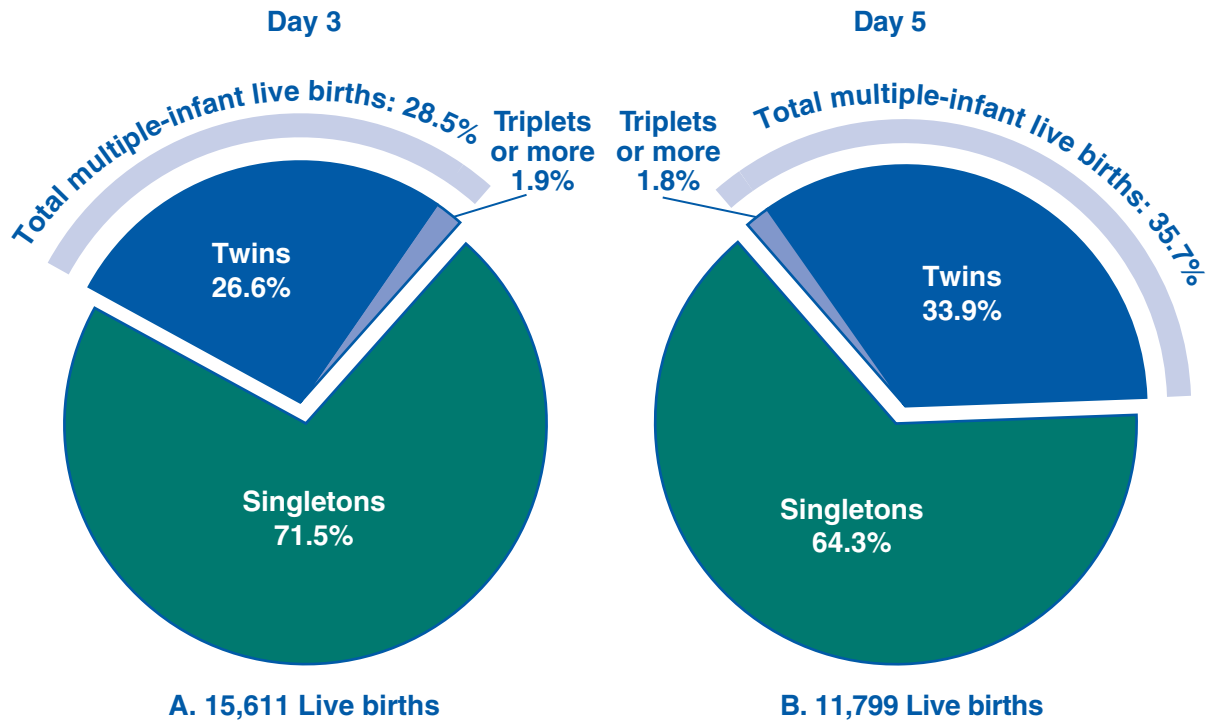
Multiple-infant births are associated with greater problems for both mothers and infants, including higher rates of caesarean section, prematurity, low birth weight, and infant disability or death.

Part A of Figure 38 shows that among the 15,611 live births that occurred following day 3 embryo transfer, about 72% were singletons, 27% were twins, and 2% were triplets or more. Thus, approximately 29% of these live births produced more than one infant.

In 2007, 11,799 live births occurred following day 5 embryo transfer. Part B of Figure 38 shows that approximately 36% of these live births produced more than one infant (34% twins and 2% triplets or more).

As shown in Figure 37 (page 51), fewer embryos were transferred on day 5 than on day 3. However, the proportion of live births resulting in twins is higher among transfer procedures performed on day 5 than on day 3. Thus, the risk of having a multiple-infant birth was higher for day 5 embryo transfers. The likelihood of multiple-infant births for both day 3 and day 5 embryo transfers is much higher overall than for multiple-infant births in the general U.S. population (about 3%).

Figure 38
Risks of Having Multiple-Infant Live Birth for ART Cycles Using Fresh Nondonor Eggs or Embryos for Day 3 and Day 5 Embryo Transfers,* 2007



* Cycles using GIFT or ZIFT are excluded. This comparison is limited to transfers on day 3 and day 5. Embryo transfers performed on days 1, 2, 4, and 6 are not included because each of these accounted for a small proportion of procedures.

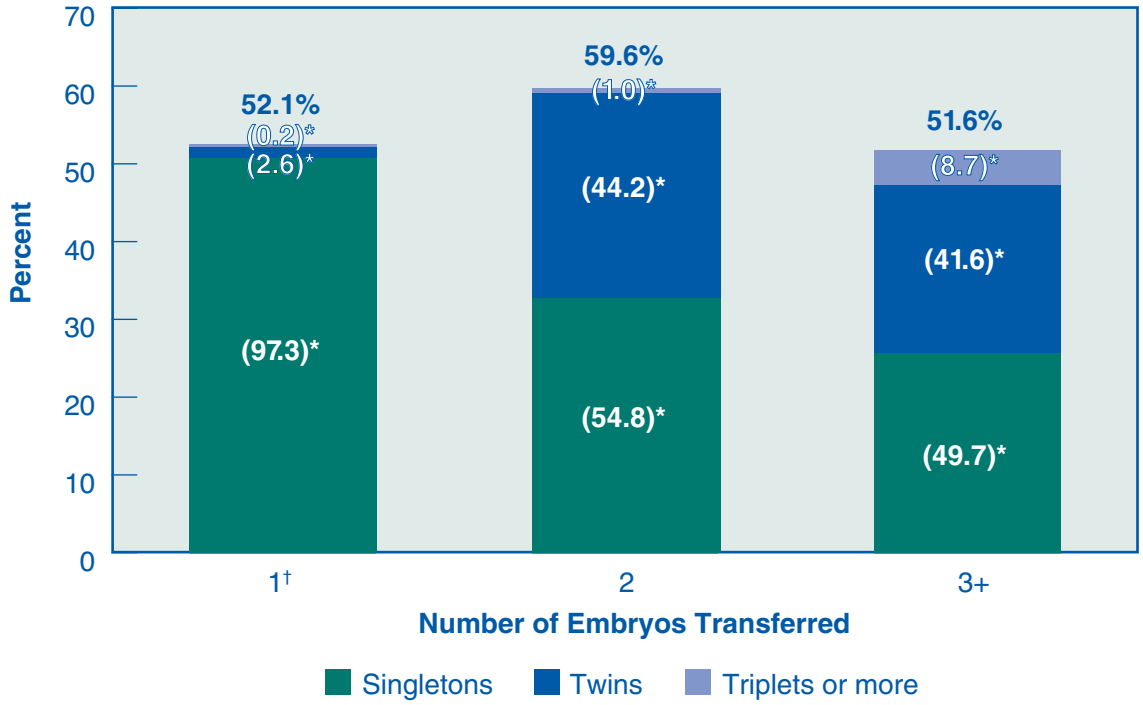
For day 5 embryo transfers, are percentages of transfers that result in live births affected by the number of embryos transferred for women who have more embryos available than they choose to transfer?

As shown in Figures 37 and 38 (pages 51–52), embryos transferred on day 5 result in more multiple-infant births compared with embryos transferred on day 3, despite the smaller number of embryos transferred on day 5. Figure 39 shows the relationship between the number of embryos transferred, the percentage of transfers resulting in live births, and the percentage of multiple-infant births for day 5 embryo transfer procedures in which the woman was younger than 35 and the couple decided to set aside some embryos for future cycles rather than transfer all available embryos at one time.

The percentage of transfers resulting in live births was the highest (about 60%) when two embryos were transferred; however, the proportion of live births that were multiples (twins or more)—which presents a higher risk for poor health outcomes—was 45%. The percentage of live births that were higher-order multiples (triplets or more) was much higher when 3 or more embryos were transferred on day 5 (almost 9%) than for those involving the transfer of just two embryos on day 5 (1%).

If one measures success as the percentage of transfers resulting in singleton live births, the highest percentage (52%) was observed with the transfer of a single embryo on day 5.

Figure 39
Percentages of Transfers That Resulted in Live Births and Percentages of Multiple-Infant Live Births for Day 5 Embryo Transfers Among Women Who Were Younger Than 35, Used Fresh Nondonor Eggs or Embryos, and Set Aside Extra Embryos for Future Use, by Number of Embryos Transferred, 2007

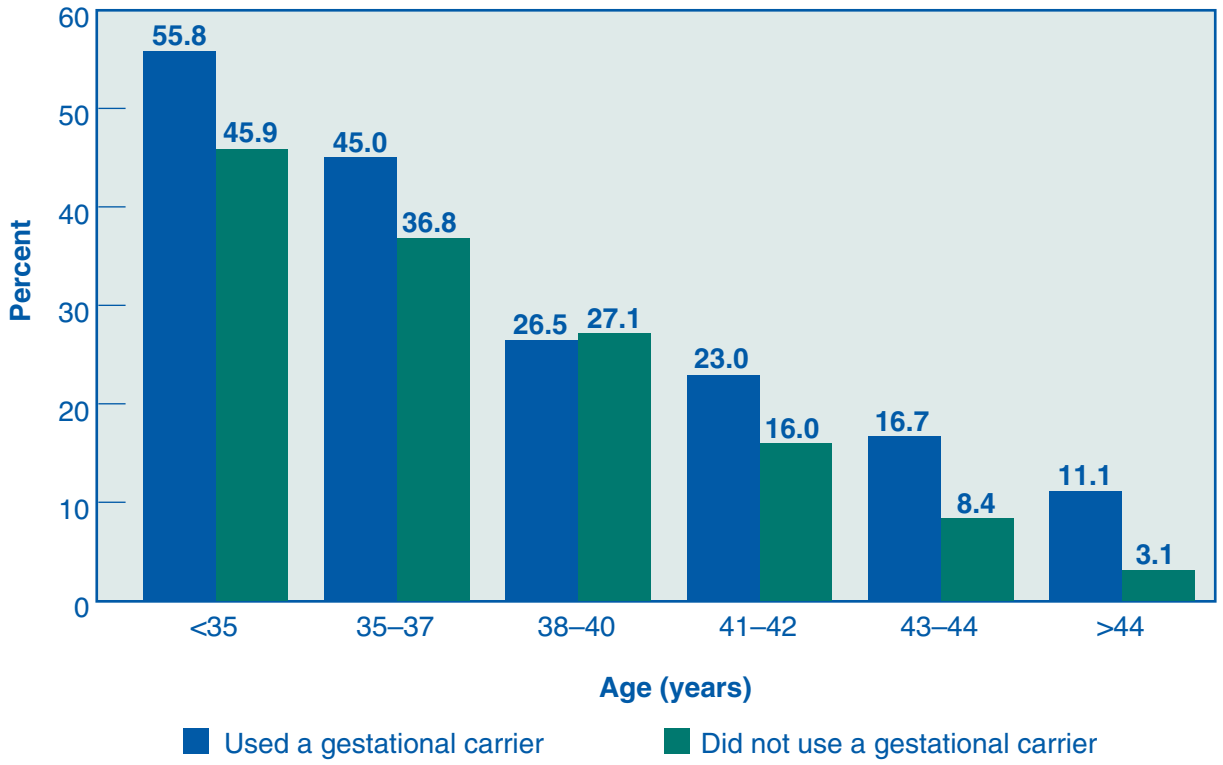


*Percentages of live births that were singletons, twins, and triplets or more are in parentheses.
Note: In rare cases a single embryo may divide and thus produce twins. For this reason a small percentage of twins resulted from a single embryo transfer and a small percentage of triplets resulted when two embryos were transferred.
†Total does not equal 100% due to rounding.

How do percentages of transfers that result in live births for women who use gestational carriers compare with women who do not use gestational carriers?

In some cases a woman has trouble carrying a pregnancy. In such cases the couple may use ART with a gestational carrier, sometimes called a surrogate. A gestational carrier is a woman who agrees to carry the developing embryo for a couple with infertility problems. Gestational carriers were used in 1% of ART cycles using fresh nondonor embryos in 2007 (733 cycles). Figure 40 compares percentages of transfers that resulted in live births for ART cycles that used a gestational carrier in 2007 with cycles that did not. In most age groups, percentages of transfers that resulted in live births for ART cycles that used gestational carriers were higher than for those cycles that did not.

Figure 40
Comparison of Percentages of Transfers Using Fresh Nondonor Embryos That Resulted in Live Births Between Cycles That Used Gestational Carriers and Those That Did Not, by ART Patient's Age,* 2007

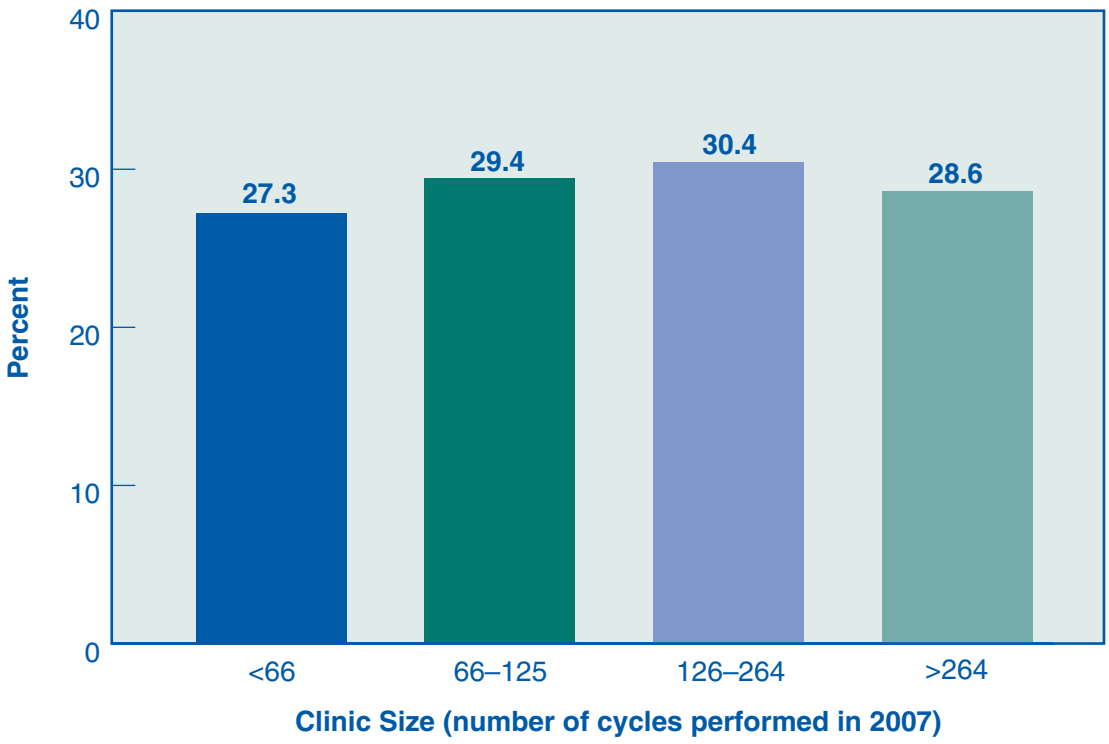


* Age categories reflect the age of the ART patient, not the age of the gestational carrier.

How is clinic size related to percentages of ART cycles that result in live births?

The number of ART procedures performed every year varies among fertility clinics in the United States. In 2007, percentages of ART cycles that resulted in live births were similar for all 430 clinics regardless of the number of cycles performed. For Figure 41, clinics were divided equally into four groups (called quartiles) based on the size of the clinic as determined by the number of ART cycles it performed. The percentage for each quartile represents the average percentage of ART cycles that resulted in live births for clinics in that quartile. For the exact number of cycles and percentage at an individual clinic, refer to the clinic table section of this report.

Figure 41
Percentages of ART Cycles Using Fresh Nondonor Eggs or Embryos That Resulted in Live Births, by Clinic Size, 2007

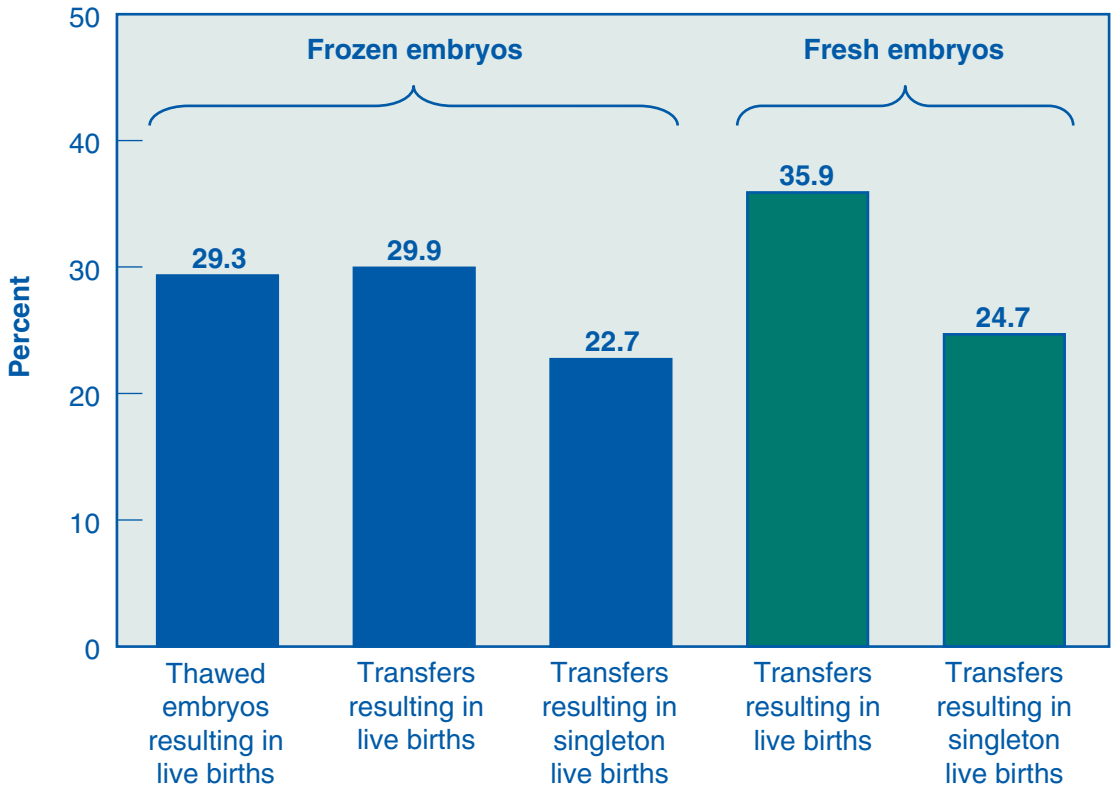


SECTION 3: ART CYCLES USING FROZEN NONDONOR EMBRYOS

What is the percentage of transfers that result in live births and singleton live births for ART cycles using frozen nondonor embryos?

Frozen embryos were used in approximately 16% of all ART cycles performed in 2007 (23,133 cycles). Figure 42 compares percentages of transfers that resulted in live births and singleton live births for frozen embryos with those for fresh embryos among women using their own eggs. Because some embryos do not survive the thawing process, the percentage of thawed embryos that result in live births is usually lower than the percentage of transfers resulting in live births. In 2007, percentages for frozen embryos were lower than for fresh embryos. However, the average number of embryos transferred was similar for cycles using frozen embryos and those using fresh embryos (see the national summary table on page 91 for information on the average number of embryos transferred for these cycles). It is important to note that cycles using frozen embryos are both less expensive and less invasive than those using fresh embryos because the woman does not have to go through the fertility drug stimulation and egg retrieval steps again.

Figure 42
Percentages of Transfers That Resulted in Live Births and Singleton Live Births for ART Cycles Using Frozen Nondonor Embryos and ART Cycles Using Fresh Nondonor Embryos, 2007



What is the risk of having a multiple-fetus pregnancy or multiple-infant live birth from an ART cycle using frozen nondonor embryos?

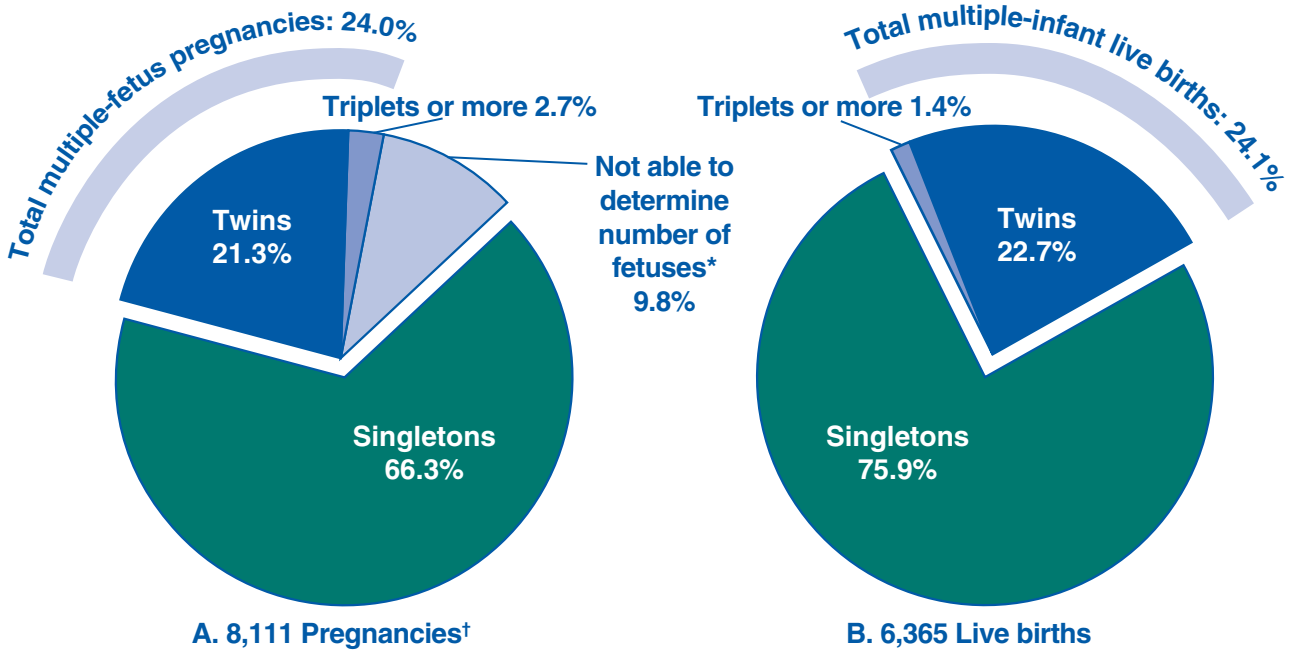
Multiple-infant births are associated with greater problems for both mothers and infants, including higher rates of caesarean section, prematurity, low birth weight, and infant disability or death.

Part A of Figure 43 shows that among the 8,111 pregnancies that resulted from ART cycles using frozen nondonor embryos, approximately 66% were singleton pregnancies, 21% were twins, and 3% were triplets or more. Almost 10% of pregnancies ended in miscarriage before the number of fetuses could be accurately determined. Therefore, the percentage of pregnancies with more than one fetus might have been higher than what was reported (24%).

In 2007, 6,365 pregnancies from ART cycles that used frozen nondonor embryos resulted in live births. Part B of Figure 43 shows that approximately 24% of these live births produced more than one infant. This compares with a multiple-infant birth rate of slightly more than 3% in the general U.S. population.

Although the total rates for multiples were similar for pregnancies and live births, there were more triplet-or-more pregnancies than births. Triplet-or-more pregnancies may be reduced to twins or singletons by the time of birth. This can happen naturally (e.g., fetal death), or a woman and her doctor may decide to reduce the number of fetuses using a procedure called multifetal pregnancy reduction. CDC does not collect information on multifetal pregnancy reductions.

Figure 43
Risks of Having Multiple-Fetus Pregnancy and Multiple-Infant Live Birth from ART Cycles Using Frozen Nondonor Embryos, 2007



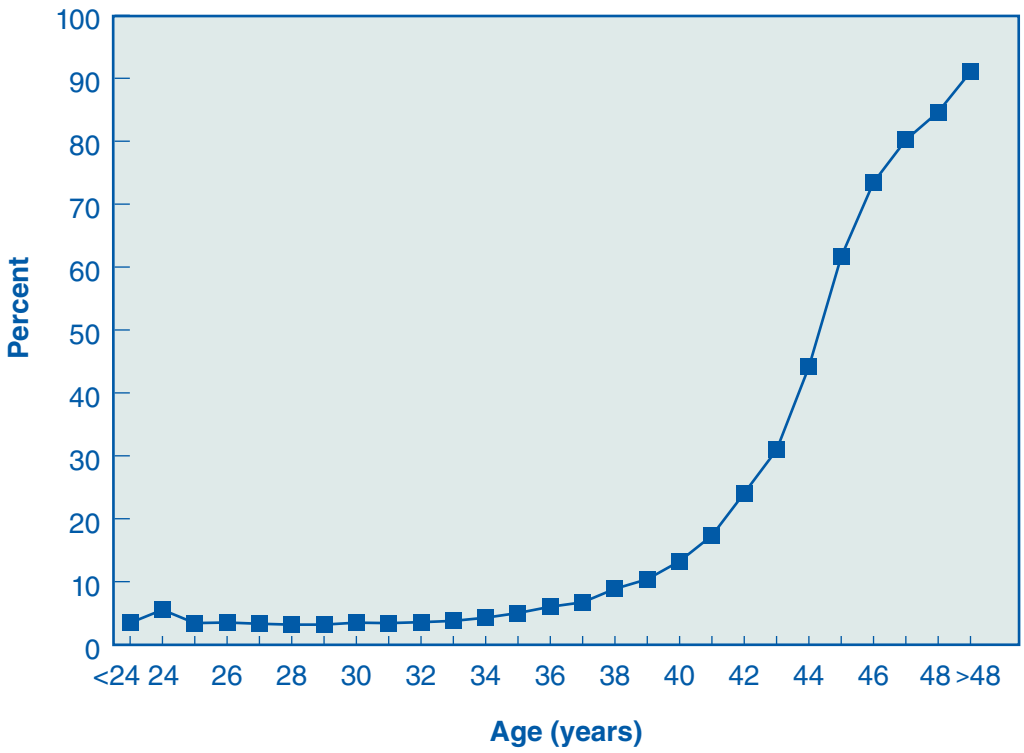
* Number of fetuses not known because the pregnancy ended in an early miscarriage.
† Total does not equal 100% due to rounding.

SECTION 4: ART CYCLES USING DONOR EGGS

Are older women undergoing ART more likely to use donor eggs or embryos?

As shown in Figures 14–16 (pages 28–30), eggs produced by women in older age groups form embryos that are less likely to implant and more likely to result in miscarriage if they do implant. As a result, ART using donor eggs is much more common among older women than among younger women. Donor eggs or embryos were used in approximately 12% of all ART cycles performed in 2007 (17,405 cycles). Figure 44 shows the percentage of ART cycles using donor eggs in 2007 according to the woman's age. Few women younger than age 40 used donor eggs; however, the percentage of cycles performed with donor eggs increased sharply starting at age 40. Among women older than age 48, for example, 91% of all ART cycles used donor eggs.

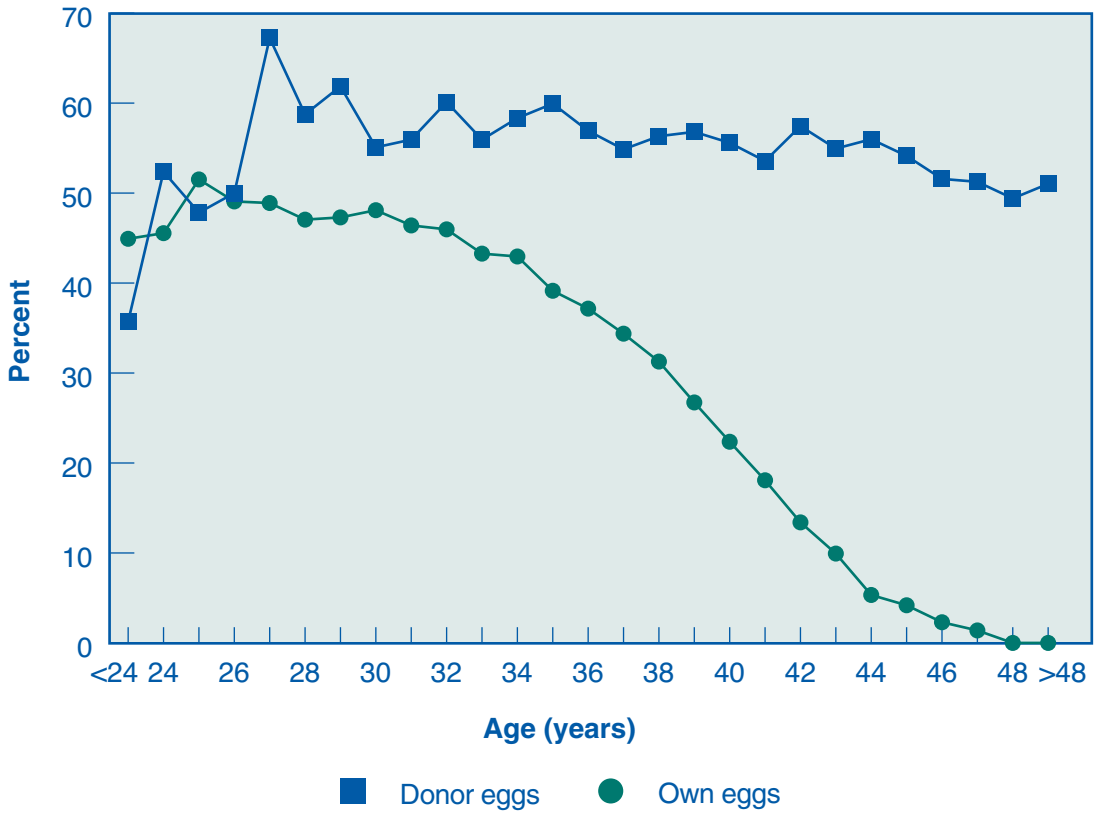
Figure 44
Percentage of ART Cycles Using Donor Eggs, by Age of Woman, 2007



Do percentages of transfers that result in live births differ by age for women who used ART with donor eggs compared with women who used ART with their own eggs?

Figure 45 compares percentages of transfers resulting in live births for ART cycles using fresh embryos from donor eggs with those for ART cycles using a woman's own eggs, among women of different ages. The likelihood of a fertilized egg implanting is related to the age of the woman who produced the egg. Thus, the percentage of transfers resulting in live births for cycles using embryos from women's own eggs declines as women get older. In contrast, since egg donors are typically in their 20s or early 30s, the percentage of transfers resulting in live births for cycles using embryos from donor eggs remained consistently high at above 50% for most patients aged 24 and older.

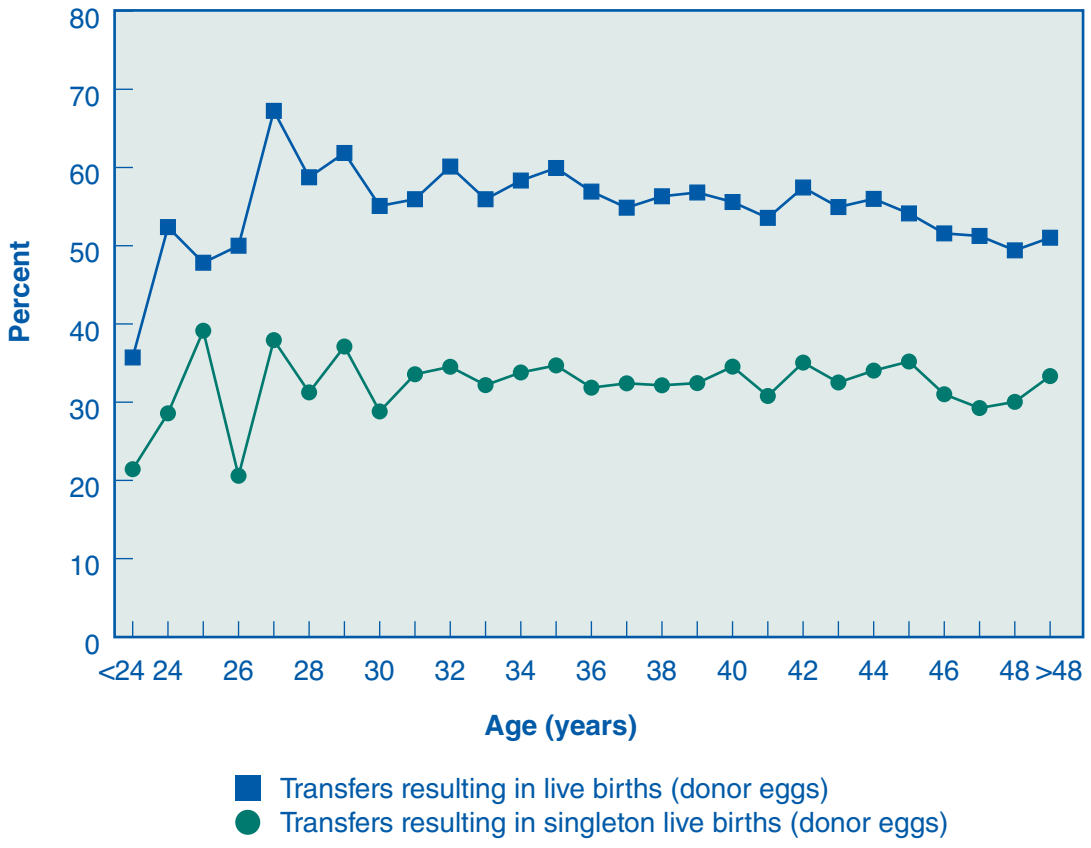
Figure 45
Percentages of Transfers That Resulted in Live Births for ART Cycles Using Fresh Embryos from Own Eggs and ART Cycles Using Donor Eggs, by Age of Woman, 2007



How successful is ART when donor eggs are used?

Figure 46 shows percentages of transfers resulting in live births and singleton live births for ART cycles using fresh embryos from donor eggs among women of different ages. For all ages, the percentage of transfers resulting in singleton live births (average 33%) was lower than the percentage of transfers resulting in live births (average 55%). Singleton live births are an important measure of success because they have a much lower risk than multiple-infant births for adverse infant health outcomes, including prematurity, low birth weight, disability, and death.

Figure 46
Percentages of Transfers That Resulted in Live Births and Singleton Live Births for ART Cycles Using Fresh Embryos from Donor Eggs, by Age of Woman, 2007



What is the risk of having a multiple-fetus pregnancy or multiple-infant live birth from an ART cycle using fresh donor eggs?

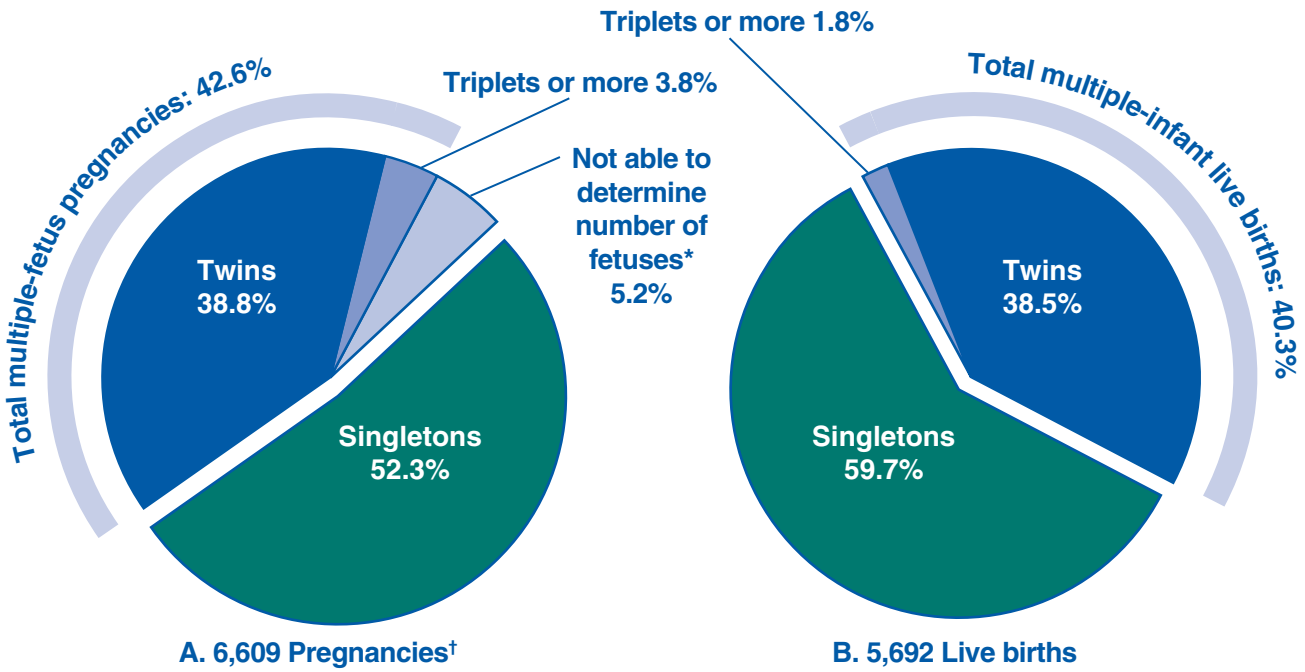
Multiple-infant births are associated with greater problems for both mothers and infants, including higher rates of caesarean section, prematurity, low birth weight, and infant disability or death.

Part A of Figure 47 shows that among the 6,609 pregnancies that resulted from ART cycles using fresh embryos from donor eggs, approximately 52% were singleton pregnancies, 39% were twins, and nearly 4% were triplets or more. About 5% of pregnancies ended in miscarriage before the number of fetuses could be accurately determined. Therefore, the percentage of pregnancies with more than one fetus might have been higher than what was reported (about 43%).

In 2007, 5,692 pregnancies from ART cycles that used fresh embryos from donor eggs resulted in live births. Part B of Figure 47 shows that 40% of these live births produced more than one infant. This compares with a multiple-infant birth rate of slightly more than 3% in the general population.

Although total percentages for multiples were similar for pregnancies and live births, there were more triplet-or-more pregnancies than births. Triplet-or-more pregnancies may be reduced to twins or singletons by the time of birth. This can happen naturally (e.g., fetal death), or a woman and her doctor may decide to reduce the number of fetuses using a procedure called multifetal pregnancy reduction. CDC does not collect information on multifetal pregnancy reductions.

Figure 47
Risks of Having Multiple-Fetus Pregnancy and Multiple-Infant Live Birth from ART Cycles Using Fresh Embryos from Donor Eggs, 2007

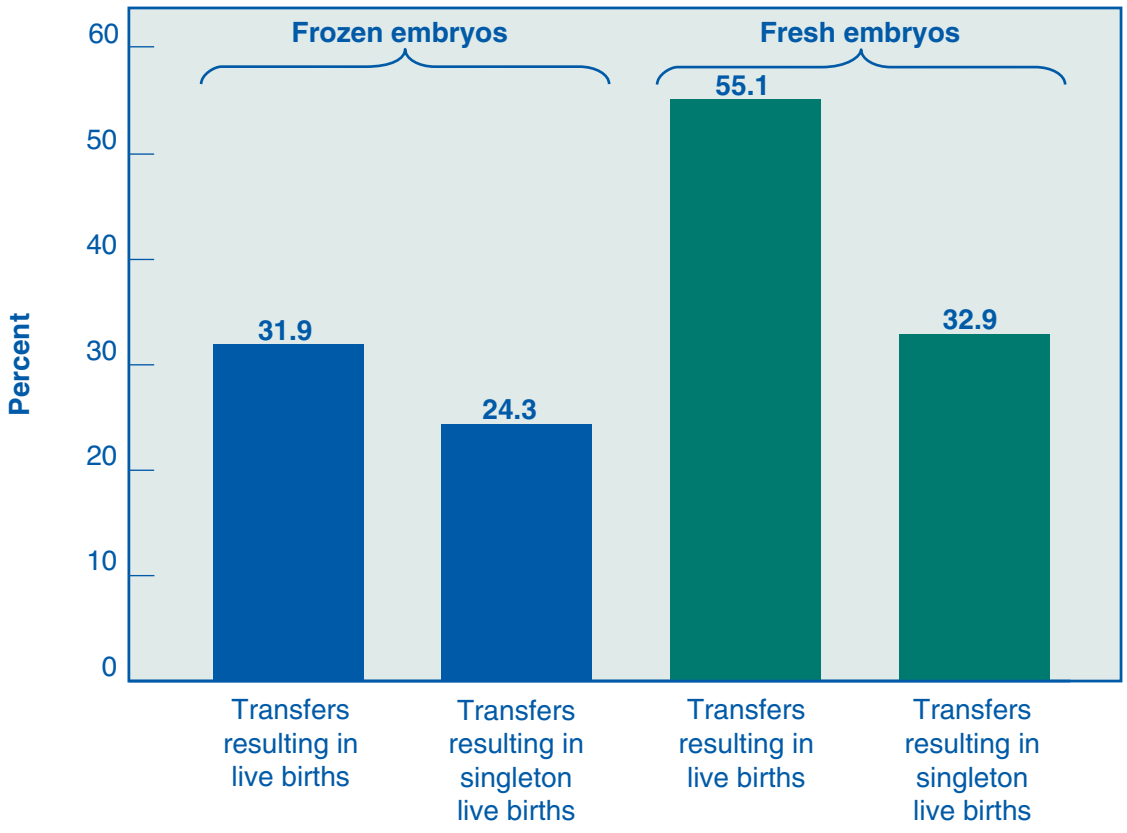


* Number of fetuses not known because the pregnancy ended in an early miscarriage.
† Total does not equal 100% due to rounding.

How do percentages of transfers that result in live births differ for ART cycles between women who use frozen donor embryos and those who use fresh donor embryos?

Figure 48 shows that percentages of transfers that resulted in live births and singleton live births for ART cycles using frozen donor embryos were substantially lower than for ART cycles using fresh donor embryos. This is similar to the findings for frozen nondonor embryos (see Figure 42, page 56). The average number of embryos transferred was similar for cycles using frozen donor embryos and those using fresh donor embryos. (See the national summary table on page 91 for information on the average number of embryos transferred for these cycles.)

Figure 48
Percentages of Transfers That Resulted in Live Births and Singleton Live Births for ART Cycles Using Frozen Donor Embryos and ART Cycles Using Fresh Donor Embryos, 2007



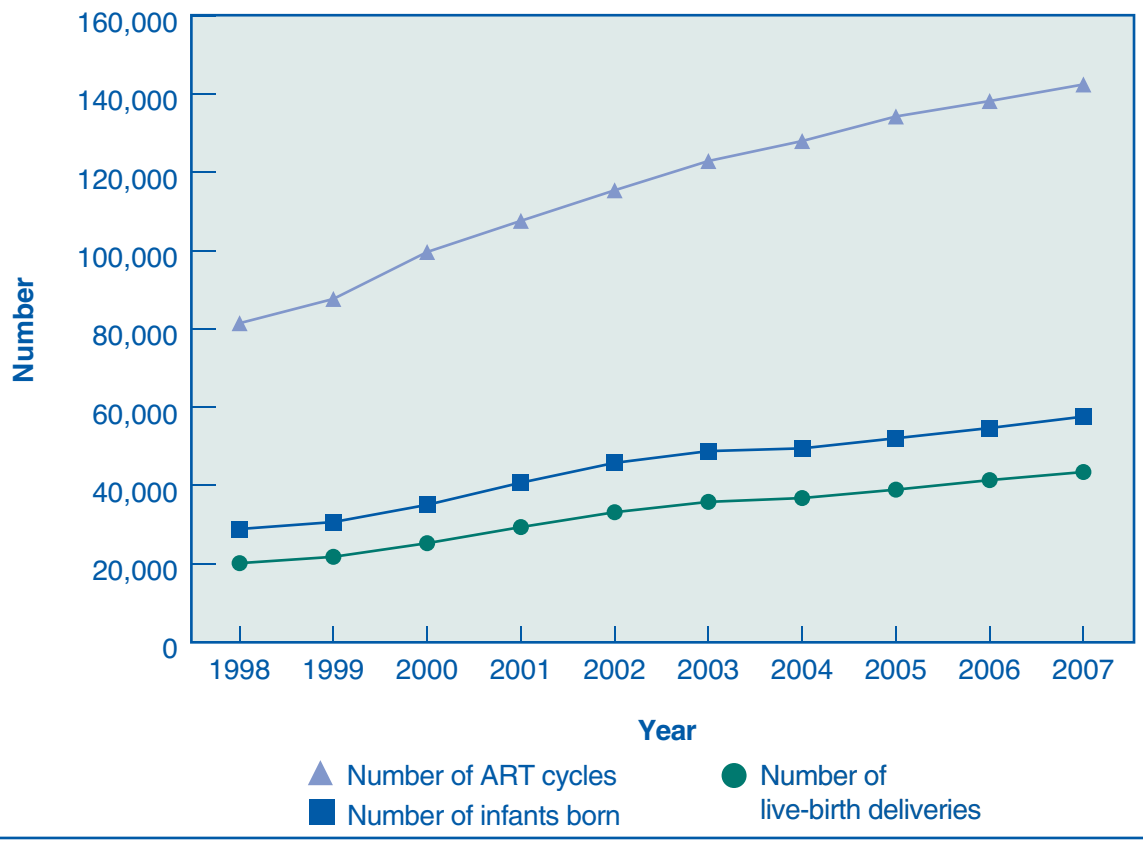
SECTION 5: ART TRENDS, 1998–2007

This report marks the thirteenth consecutive year that CDC has published an annual report detailing the success rates for ART clinics in the United States. Having several years of data provides us with the opportunity to examine trends in ART use and success rates over time. This report features an examination of trends for the most recent 10 years, 1998–2007. Statistics for 1996 and 1997 are available in 2006 Assisted Reproductive Technology Success Rates: National Summary and Fertility Clinic Reports, *Figures 49–64.*

Is the use of ART increasing?

Figure 49 shows the numbers of ART cycles performed, live-birth deliveries, and infants born using ART from 1998 through 2007. The number of ART cycles performed in the United States has nearly doubled, from 81,438 cycles in 1998 to 142,435 in 2007. The number of live-birth deliveries in 2007 (43,412) was more than two times higher than in 1998 (20,126). The number of infants born who were conceived using ART also increased steadily between 1998 and 2007. In 2007, 57,569 infants were born, which was about two times the 28,851 born in 1998. Because in some cases more than one infant is born during a live-birth delivery (e.g., twins), the total number of infants born is greater than the number of live-birth deliveries.

Figure 49
Numbers of ART Cycles Performed, Live-Birth Deliveries, and Infants Born Using ART, 1998–2007



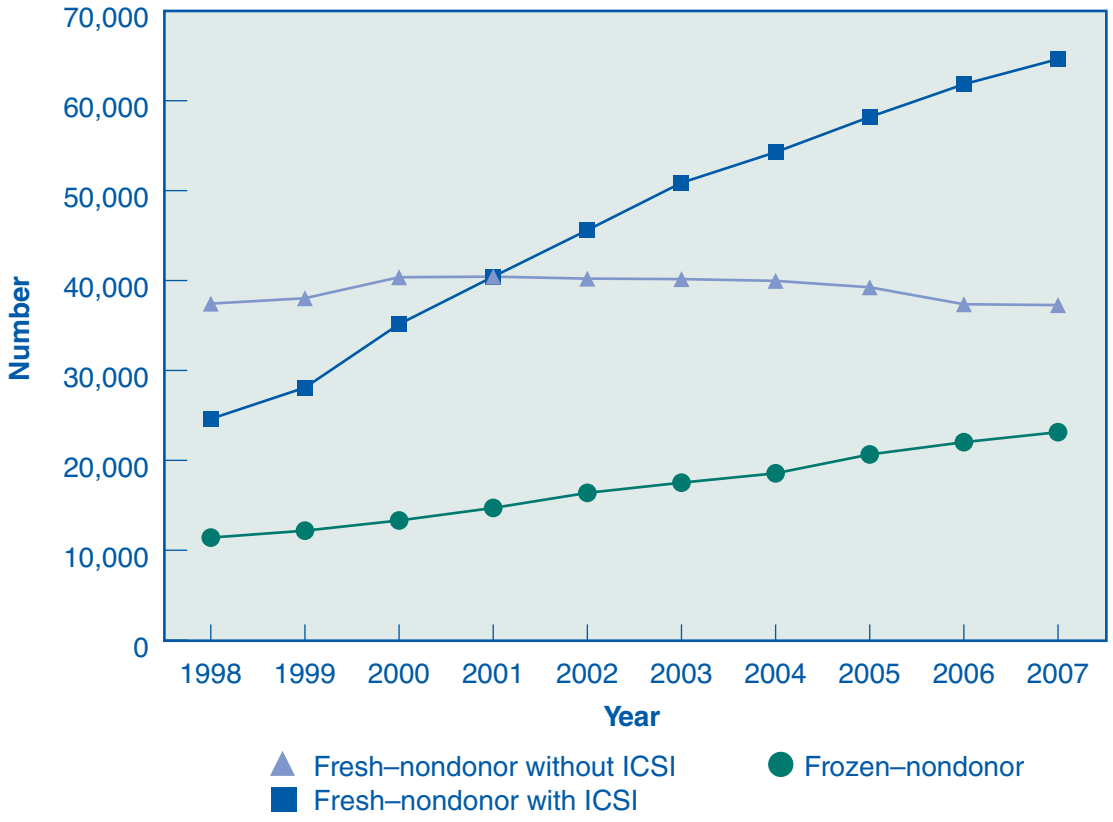
Have there been changes in the types of ART cycles performed among women who used fresh or frozen nondonor eggs or embryos?

Intracytoplasmic sperm injection (ICSI) was originally developed to use in ART cycles to improve fertilization rates when severe male factor infertility was the indication for using ART. Today, this procedure is widely used even among couples without a diagnosis of male factor infertility.

Figure 50 shows the numbers of ART cycles performed using fresh nondonor eggs or embryos with or without ICSI and the numbers of cycles using frozen nondonor eggs or embryos from 1998 through 2007. During the past 10 years, while the number of fresh–nondonor cycles performed without ICSI remained stable, the number of fresh–nondonor cycles performed with ICSI increased more than 2.5 times from 24,612 in 1998 to 64,629 in 2007. The number of frozen–nondonor cycles also more than doubled, from 11,407 in 1998 to 23,133 in 2007.

Note that the information on use of ICSI is not consistently collected across clinics for ART cycles using frozen embryos; therefore, cycles using frozen nondonor eggs or embryos are presented together as one group.

Figure 50
Numbers of ART Cycles Using Fresh or Frozen Nondonor Eggs or Embryos, by ICSI,* 1998–2007



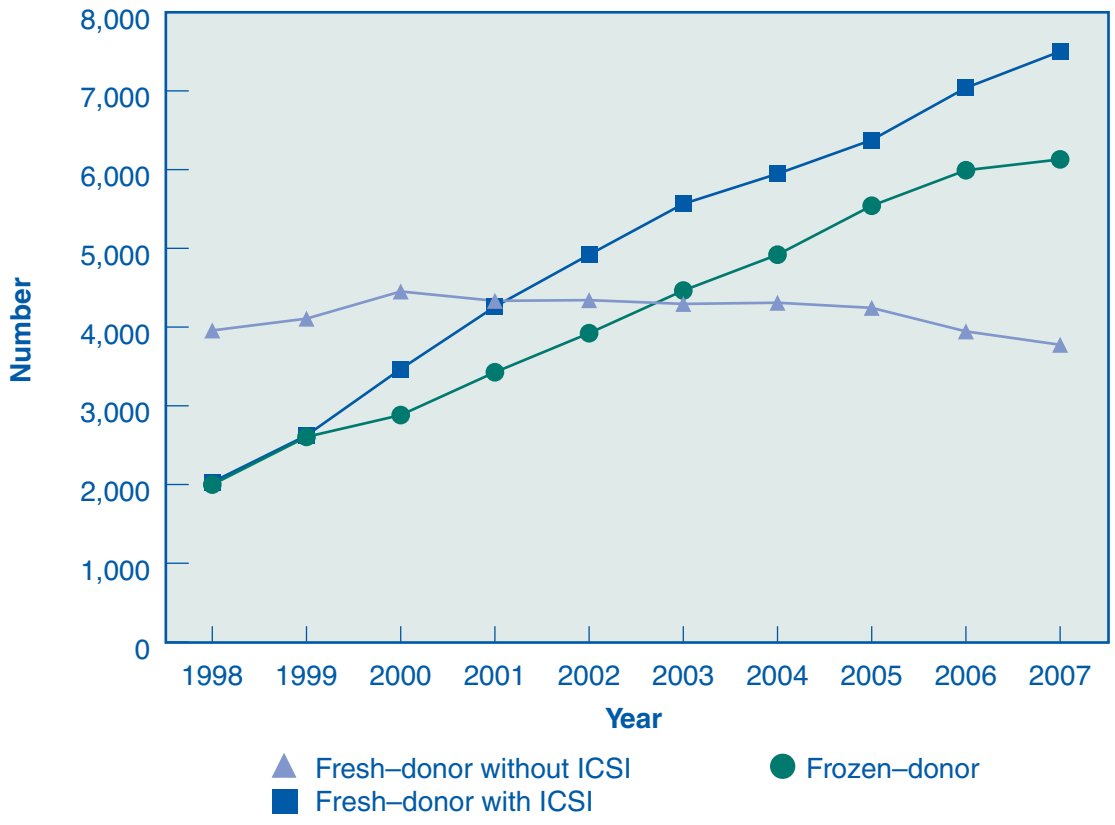
* Intracytoplasmic sperm injection.

Have there been changes in the types of ART cycles performed among women who used fresh or frozen donor eggs or embryos?

Figure 51 shows the numbers of ART cycles performed using fresh donor eggs or embryos with or without ICSI and the numbers of cycles using frozen donor eggs or embryos. While the number of fresh–donor cycles performed without ICSI remained fairly stable during the past 10 years, the number of fresh–donor cycles performed with ICSI increased from 2,031 in 1998 to 7,500 in 2007. The number of frozen–donor cycles increased from 1,999 in 1998 to 6,130 in 2007. In particular, during reporting year 2007, fresh donor eggs with ICSI were used the most among all donor cycles.

Note that the information on use of ICSI is not consistently collected across clinics for ART cycles using frozen embryos; therefore, cycles using frozen donor eggs or embryos are presented together as one group.

Figure 51
Numbers of ART Cycles Using Fresh or Frozen Donor Eggs or Embryos, by ICSI,* 1998–2007



* Intracytoplasmic sperm injection.

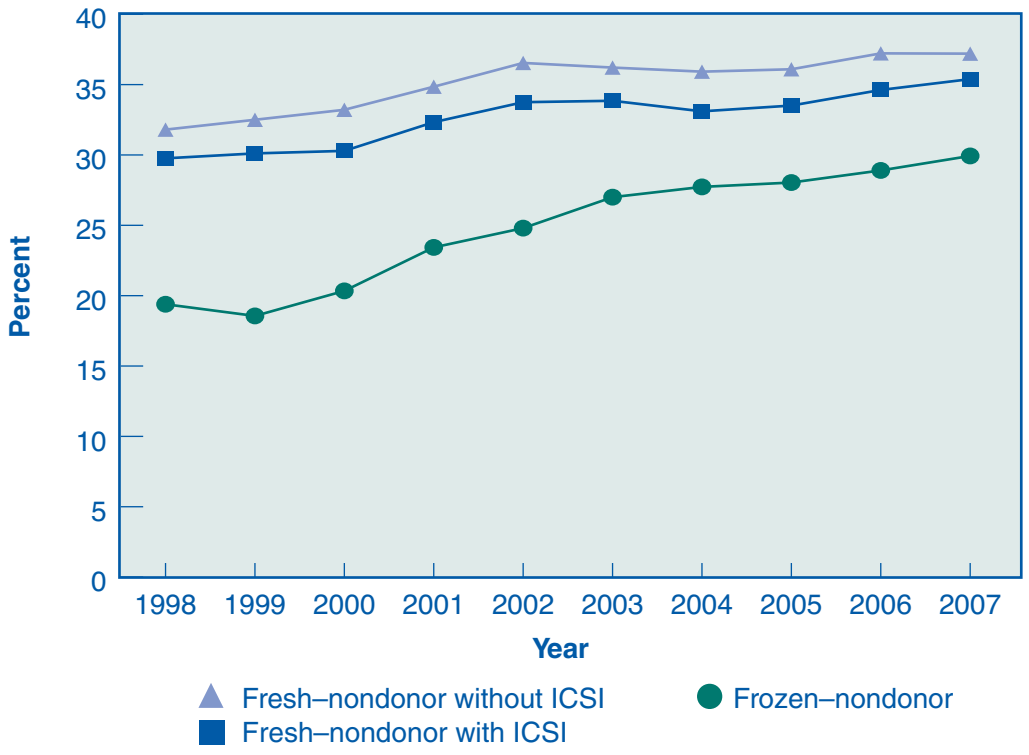
Have there been changes in percentages of transfers that resulted in live births among women who used fresh or frozen nondonor eggs or embryos?

Figure 52 presents percentages of transfers that resulted in live births for ART cycles using fresh nondonor eggs or embryos with or without ICSI and for cycles using frozen nondonor eggs or embryos. Percentages of transfers that resulted in live births are presented rather than percentages of cycles that resulted in live births because this is the only way to directly compare cycles using fresh embryos with those using frozen embryos.

Overall, higher percentages of transfers that resulted in live births were consistently observed among fresh–nondonor cycles when compared with frozen–nondonor cycles. The percentage of transfers that resulted in live births for fresh–nondonor cycles performed without ICSI increased from 32% in 1998 to 37% in 2007. Over the same period, the percentage of transfers that resulted in live births for cycles using fresh nondonor embryos with ICSI remained slightly lower than those without ICSI, but steadily increased. The percentage of transfers that resulted in live births for cycles using frozen nondonor embryos increased from 19% in 1998 to 30% in 2007, but was generally lower than the percentage of transfers that resulted in live births for cycles using fresh nondonor embryos.

Note that the information on use of ICSI is not consistently collected across clinics for ART cycles using frozen embryos; therefore, cycles using frozen nondonor eggs or embryos are presented together as one group.

Figure 52
Percentages of Transfers That Resulted in Live Births Using Fresh or Frozen Nondonor Eggs or Embryos, by ICSI,* 1998–2007



* Intracytoplasmic sperm injection.

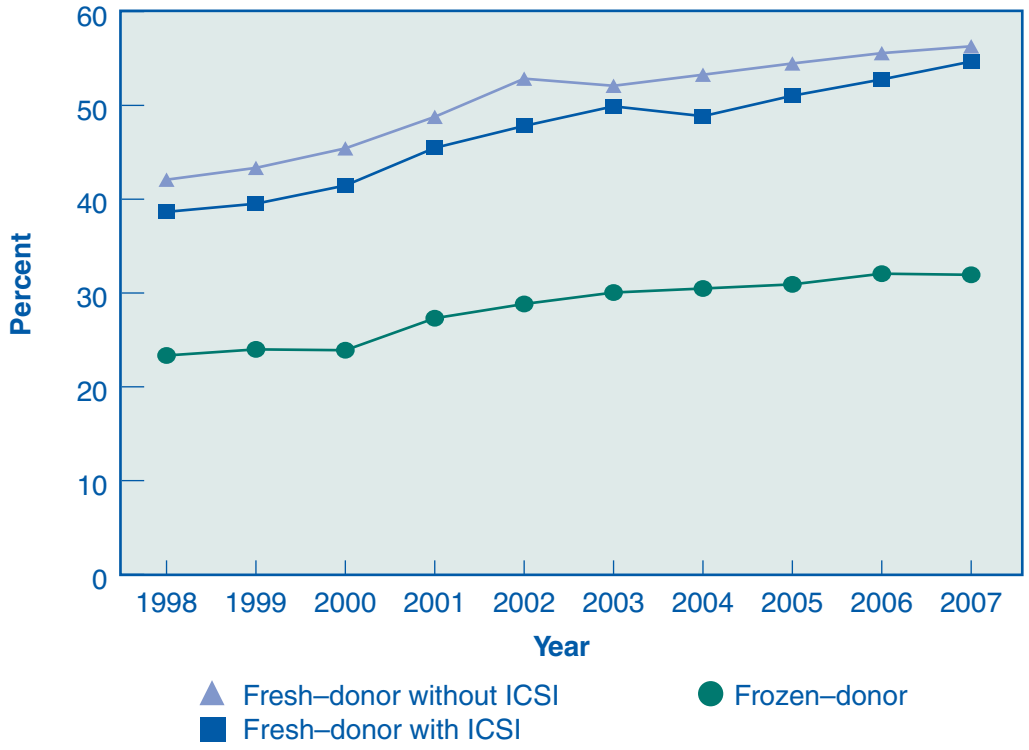
Have there been changes in percentages of transfers that resulted in live births among women who used fresh or frozen donor eggs or embryos?

Figure 53 presents percentages of transfers that resulted in live births for ART cycles using fresh donor eggs or embryos with or without ICSI and for cycles using frozen donor eggs or embryos. Percentages of transfers that resulted in live births are presented rather than percentages of cycles that resulted in live births because this is the only way to directly compare cycles using fresh embryos with those using frozen embryos.

Similar to the trends shown in Figure 52 (page 66) for nondonor cycles, percentages of transfers that resulted in live births for cycles using fresh donor eggs or embryos were generally higher than for cycles using frozen donor eggs or embryos during 1998–2007. The percentage of transfers that resulted in live births for cycles that used fresh donor eggs or embryos performed without ICSI increased from 42% in 1998 to 56% in 2007. Over the same period, the percentage of transfers that resulted in live births increased from 39% to 55% for cycles using fresh donor eggs or embryos with ICSI, and from 23% to 32% for cycles using frozen donor eggs or embryos.

Note that the information on use of ICSI is not consistently collected across clinics for ART cycles using frozen embryos; therefore, cycles using frozen donor eggs or embryos are presented together as one group.

Figure 53
Percentages of Transfers That Resulted in Live Births Using Fresh or Frozen Donor Eggs or Embryos, by ICSI,* 1998–2007



* Intracytoplasmic sperm injection.

Have there been changes in percentages of transfers that resulted in singleton live births among women who used fresh or frozen nondonor eggs or embryos?

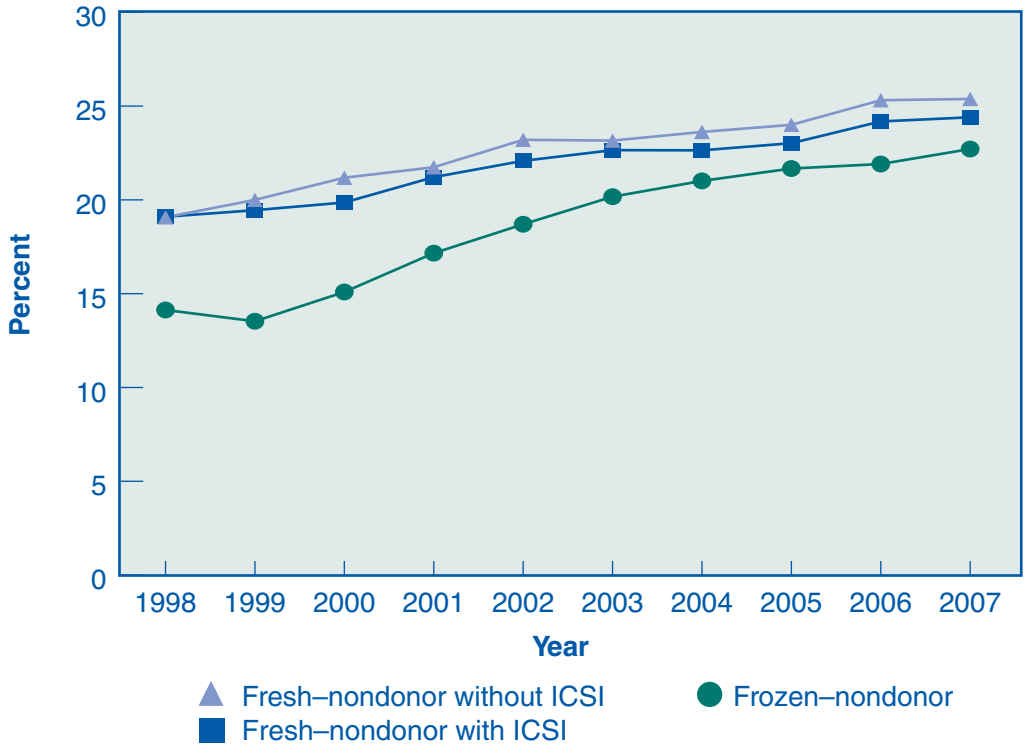
Singleton live births are an important measure of success because they entail a much lower risk than multiple-infant births for adverse infant health outcomes, including prematurity, low birth weight, disability, and death. Figure 54 presents percentages of transfers that resulted in singleton live births for ART cycles using fresh nondonor eggs or embryos with or without ICSI and for cycles using frozen nondonor eggs or embryos.

While the total numbers of nondonor cycles using ICSI greatly increased over the past 10 years (see Figure 50, page 64), the percentage of transfers that resulted in singleton live births from these cycles were not any higher than those without ICSI: 19%–24% with ICSI versus 19%–25% without ICSI.

Over the same period, the percentage of transfers that resulted in singleton live births among frozen–nondonor cycles increased from 14% to 23%.

Note that the information on use of ICSI is not consistently collected across clinics for ART cycles using frozen embryos; therefore, cycles using frozen nondonor eggs or embryos are presented together as one group.

Figure 54
Percentages of Transfers That Resulted in Singleton Live Births Using Fresh or Frozen Nondonor Eggs or Embryos, by ICSI,* 1998–2007



* Intracytoplasmic sperm injection.

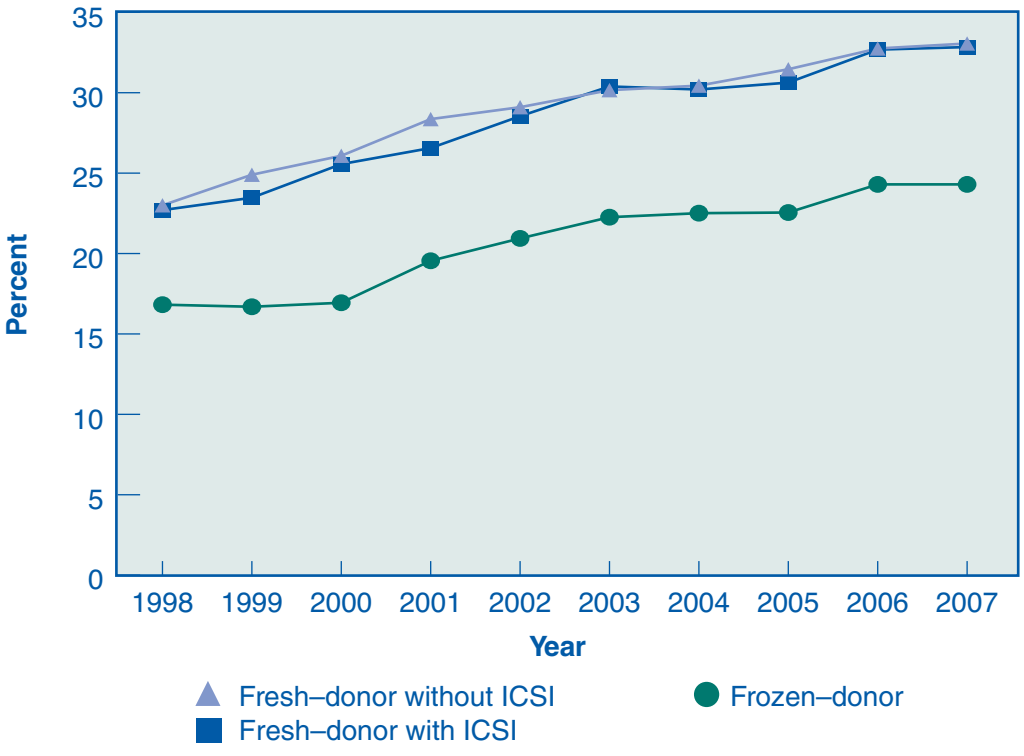
Have there been changes in percentages of transfers that resulted in singleton live births among women who used fresh or frozen donor eggs or embryos?

Singleton live births are an important measure of success because they entail a much lower risk than multiple-infant births for adverse infant health outcomes, including prematurity, low birth weight, disability, and death. Figure 55 presents percentages of transfers that resulted in singleton live births for ART cycles using fresh donor eggs or embryos with or without ICSI and for cycles using frozen donor eggs or embryos.

The percentage of transfers that resulted in singleton live births were consistently higher for fresh–donor cycles than for frozen–donor cycles. Percentages increased for fresh–donor cycles without ICSI from 23% in 1998 to 33% in 2007; the same increase was observed for cycles with ICSI. Over the same period, the percentage of transfers that resulted in singleton live births increased from 17% to 24% for frozen–donor cycles.

Note that the information on use of ICSI is not consistently collected across clinics for ART cycles using frozen embryos; therefore, cycles using frozen donor eggs or embryos are presented together as one group.

Figure 55
Percentages of Transfers That Resulted in Singleton Live Births Using Fresh or Frozen Donor Eggs or Embryos, by ICSI,* 1998–2007



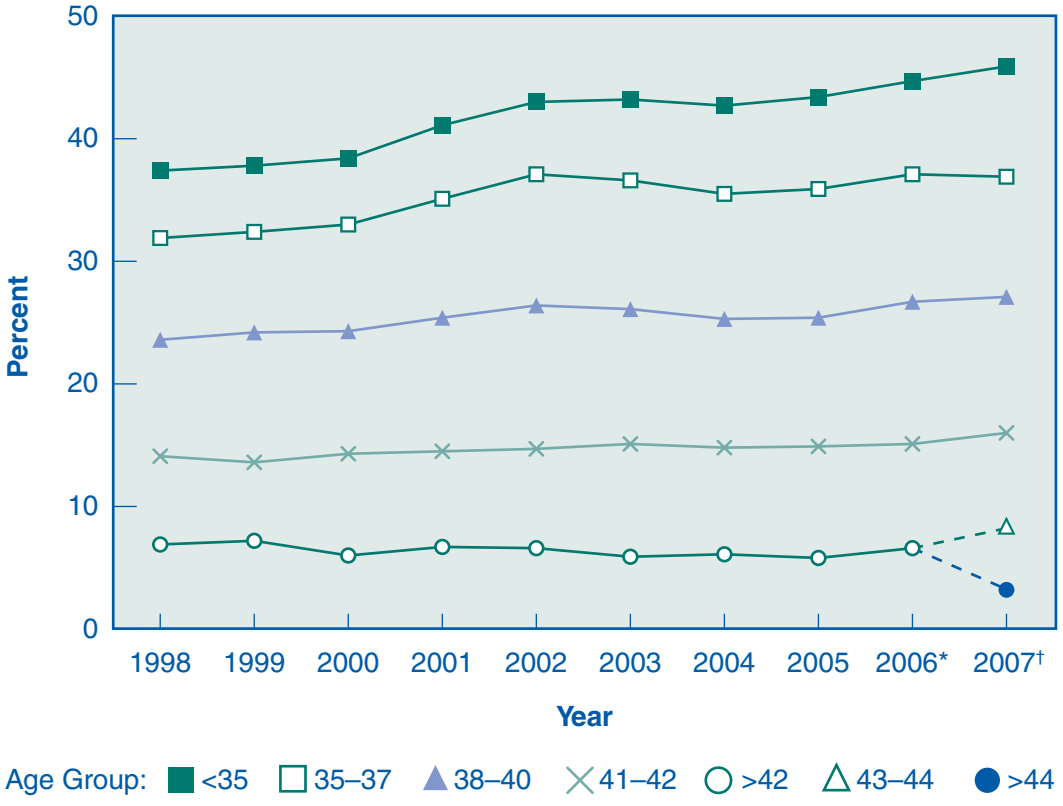
* Intracytoplasmic sperm injection.

Have there been changes in percentages of transfers that resulted in live births for all ART patients or only for those in particular age groups?

Figure 56 presents percentages of transfers that resulted in live births, by woman's age, for ART cycles using fresh nondonor eggs or embryos.

From 1998 through 2007, the percentage of transfers that resulted in live births for women younger than 35 increased 23%, from 37% in 1998 to 46% in 2007. Over the same period, the percentage of transfers that resulted in live births increased 16% (from 32% to 37%) for women 35–37, 15% (from 24% to 27%) for women 38–40, and 13% (from 14% to 16%) for women 41–42. Please note the percentage of transfers that resulted in live births were rounded to the nearest whole number while the percent changes were calculated using raw data.

Figure 56
Percentages of Transfers That Resulted in Live Births for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Woman's Age, 1998–2007



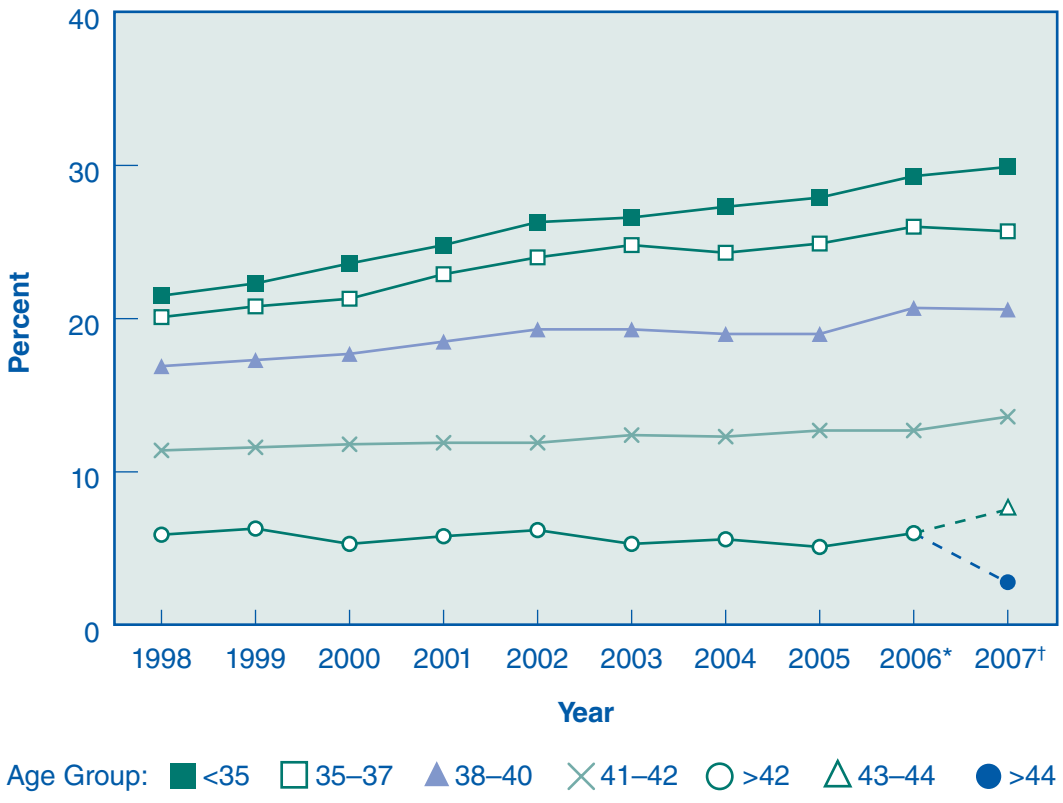
*2006 was the last year in which data were reported together for women older than 42.
†2007 was the first year in which data for women older than 42 were subdivided into ages 43–44 and >44.

Have there been changes in percentages of transfers that resulted in singleton live births for all ART patients or only for those in particular age groups?

Singleton live births are an important measure of success because they have a much lower risk than multiple-infant births for adverse infant health outcomes, including prematurity, low birth weight, disability, and death. Figure 57 presents percentages of transfers that resulted in singleton live births, by woman's age, for ART cycles using fresh nondonor eggs or embryos.

From 1998 through 2007, the percentage of transfers that resulted in singleton live births for women younger than 35 increased 39%, from 22% in 1998 to 30% in 2007. Over the same period, the percentage of transfers that resulted in singleton live births increased 28% (from 20% to 26%) for women 35–37, 22% (from 17% to 21%) for women 38–40, and 19% (from 11% to 14%) for women 41–42. Please note the percentage of transfers that resulted in singleton live births were rounded to the nearest whole number while the percent changes were calculated using raw data.

Figure 57
Percentage of Transfers That Resulted in Singleton Live Births for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Woman's Age, 1998–2007

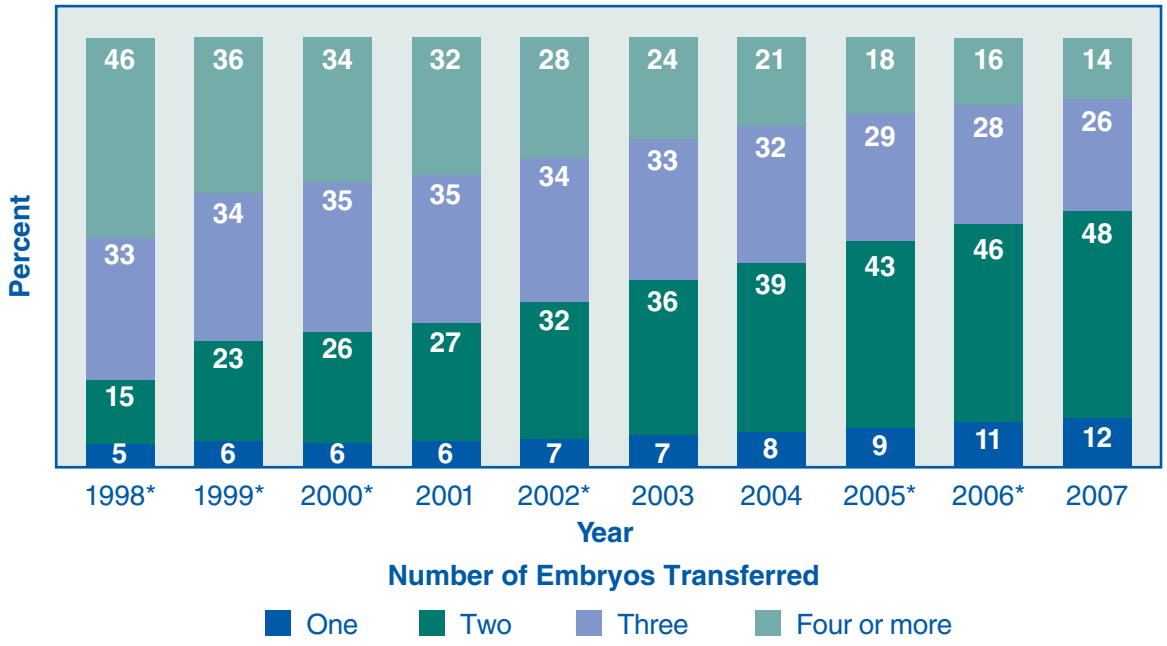


*2006 was the last year in which data were reported together for women older than 42.
†2007 was the first year in which data for women older than 42 were subdivided into ages 43–44 and >44.

Has the number of embryos transferred changed in fresh–nondonor cycles?

Figure 58 presents the trends for the number of embryos transferred in fresh–nondonor cycles that progressed to the embryo transfer stage. From 1998 through 2007, cycles that involved the transfer of one embryo more than doubled, from 5% to 12%; cycles that involved the transfer of two embryos increased dramatically, from 15% in 1998 to 48% in 2007. Cycles that involved the transfer of three embryos decreased from 33% in 1998 to 26% in 2007, and cycles that involved the transfer of four or more embryos decreased dramatically from 46% in 1998 to 14% in 2007.

Figure 58
Percentages of Fresh–Nondonor Cycles That Involved the Transfer of One, Two, Three, or Four or More Embryos, 1998–2007



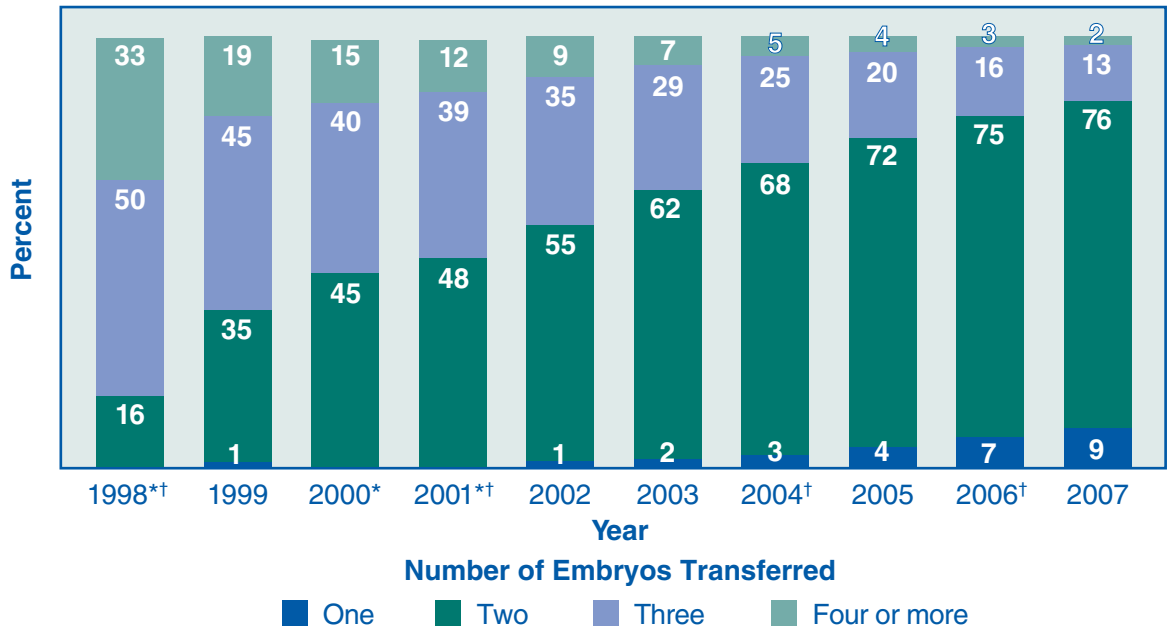
*Totals do not equal 100% due to rounding.

Has the number of embryos transferred changed in fresh–nondonor cycles for women younger than 35 who have more embryos available than they choose to transfer?

As shown in Figure 58 (page 72), the number of embryos transferred in fresh–nondonor cycles has decreased during the past 10 years. Figure 59 shows the change over time in the number of embryos transferred for ART procedures in which the woman was younger than 35 and the couple chose to set aside some embryos for future cycles rather than transfer all available embryos at one time. Previous research suggests that the number of embryos available for an ART cycle is important in predicting success. Younger women also tend to have higher percentages of ART cycles that result in pregnancies and live births (see Figure 14, page 28).

Overall, the number of embryos transferred decreased among couples who chose to transfer fewer embryos than were available. In 1998, about one-third (33%) of ART cycles involved the transfer of four or more embryos; 50%, three embryos; 16%, two embryos; and less than 1%, one embryo. By the next year, 1999, the percentage of cycles in which four or more embryos were transferred had decreased to 19%; 45% of cycles, three embryos; 35% of cycles, two embryos; and 1%, one embryo. By 2007, four or more embryos were transferred in only 2% of cycles, three in 13% of cycles, two in 76% of cycles, and one in 9% of cycles.

Figure 59
Percentages of Fresh–Nondonor Cycles That Involved the Transfer of One, Two, Three, or Four or More Embryos in Women Who Were Younger Than 35 and Set Aside Extra Embryos for Future Use, 1998–2007



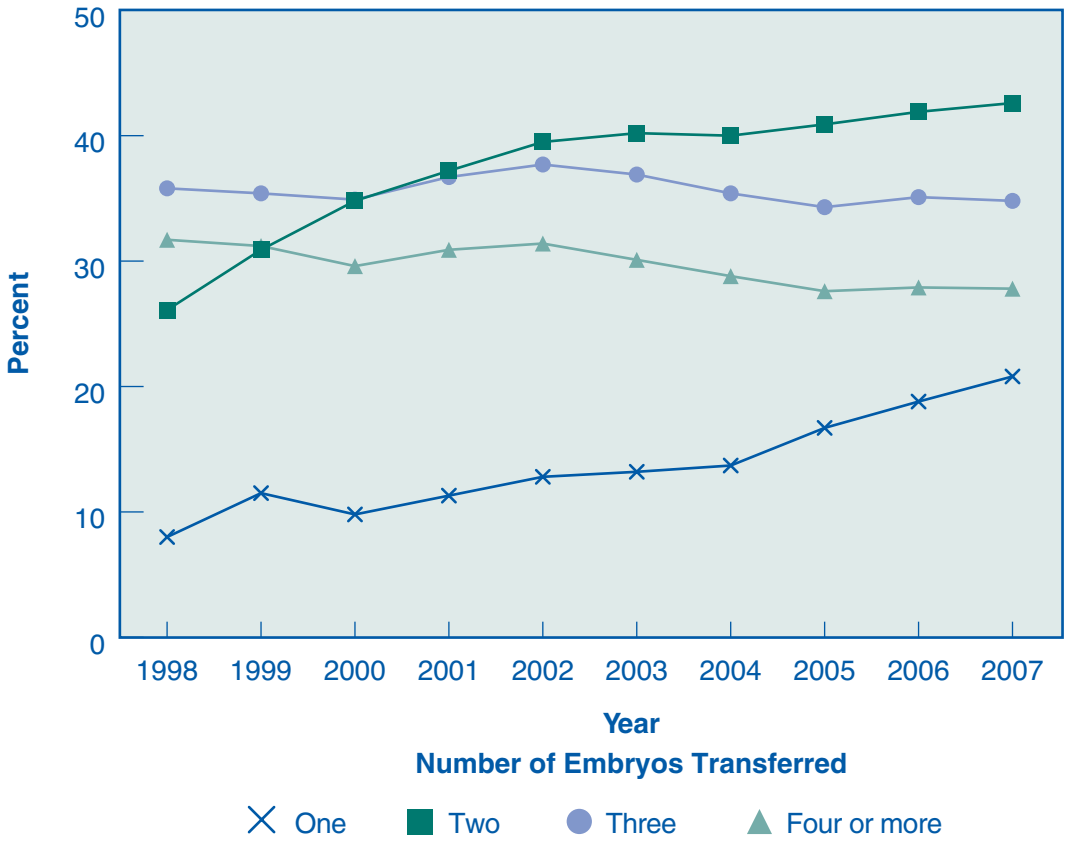
*Cycles involving the transfer of one embryo were not included because of the small number of cycles where one embryo was transferred and extra embryos were set aside for future use.
†Totals do not equal 100% due to rounding.

Have there been changes in percentages of transfers that resulted in live births, by number of embryos transferred?

Figure 60 presents percentages of transfers that resulted in live births, by the number of embryos transferred for ART cycles using fresh nondonor eggs or embryos from 1998 through 2007. The percentage of transfers resulting in live births increased the most for ART cycles that involved the transfer of one or two embryos (8% to 21% and 26% to 43%, respectively). However, there were no increases for ART cycles that involved the transfer of three or four or more embryos (32% to 28% and 36% to 35%, respectively).

The relationship between number of embryos transferred and success rates is complicated by several factors, such as the woman's age and embryo quality. Trends over time may reflect changes in these factors.

Figure 60
Percentages of Transfers That Resulted in Live Births Using Fresh Nondonor Eggs or Embryos, by Number of Embryos Transferred, 1998–2007



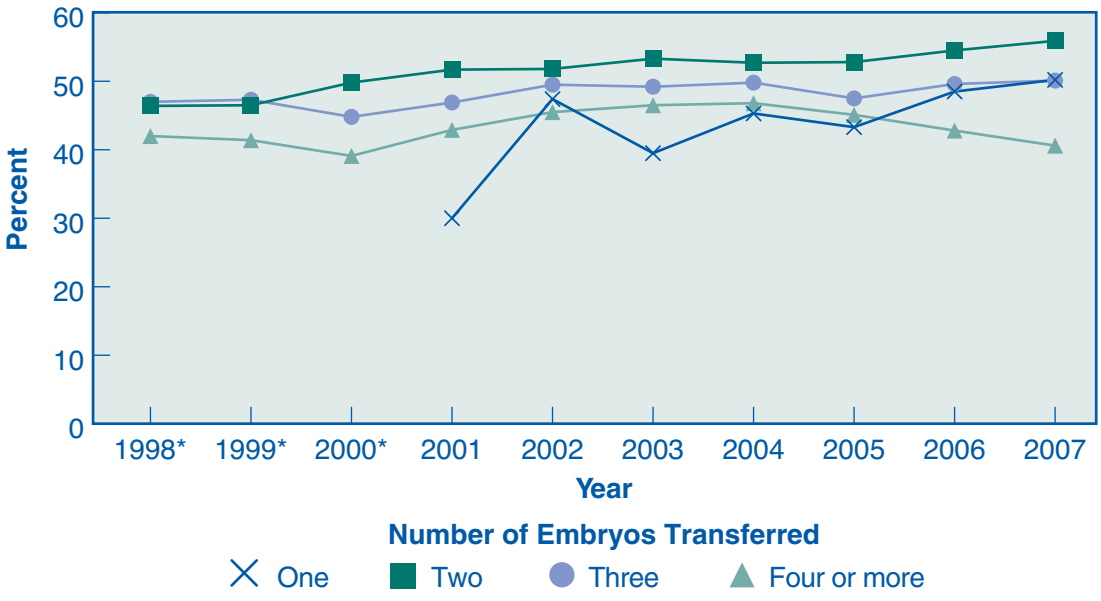
Have there been changes in percentages of transfers that resulted in live births for women younger than 35 who have more embryos available than they choose to transfer?

Figure 61 shows changes over time in the number of embryos transferred and the percentage of transfers that resulted in live births for ART cycles in which the woman was younger than 35 and chose to set aside some embryos for future cycles rather than transfer all available embryos at one time. Previous research suggests that the number of embryos available for an ART cycle is an important predictor of success. Younger women also tend to have higher percentages of ART cycles that result in pregnancies and live births (see Figure 14, page 28).

For this group of women, the percentage of transfers that resulted in live births increased over time, when one, two, or three embryos were transferred. The biggest increase was for cycles in which two embryos were transferred, from 46% in 1998 to 56% in 2007.

Percentages of transfers that resulted in live births for cycles involving the transfer of one embryo were comparable to those that involved two or three embryos. Elective single-embryo transfer minimizes the risk for multiple-fetus pregnancy and related adverse outcomes. Recently, the Society for Assisted Reproductive Technology (SART) revised its embryo transfer guidelines to encourage single-embryo transfer among patients with good prognoses. (For more information, contact SART by telephone at 205-978-5000 or online at www.sart.org.)

Figure 61
Percentages of Transfers That Resulted in Live Births Among Women Who Were Younger Than 35 and Set Aside Extra Embryos for Future Use, by Number of Embryos Transferred, 1998–2007



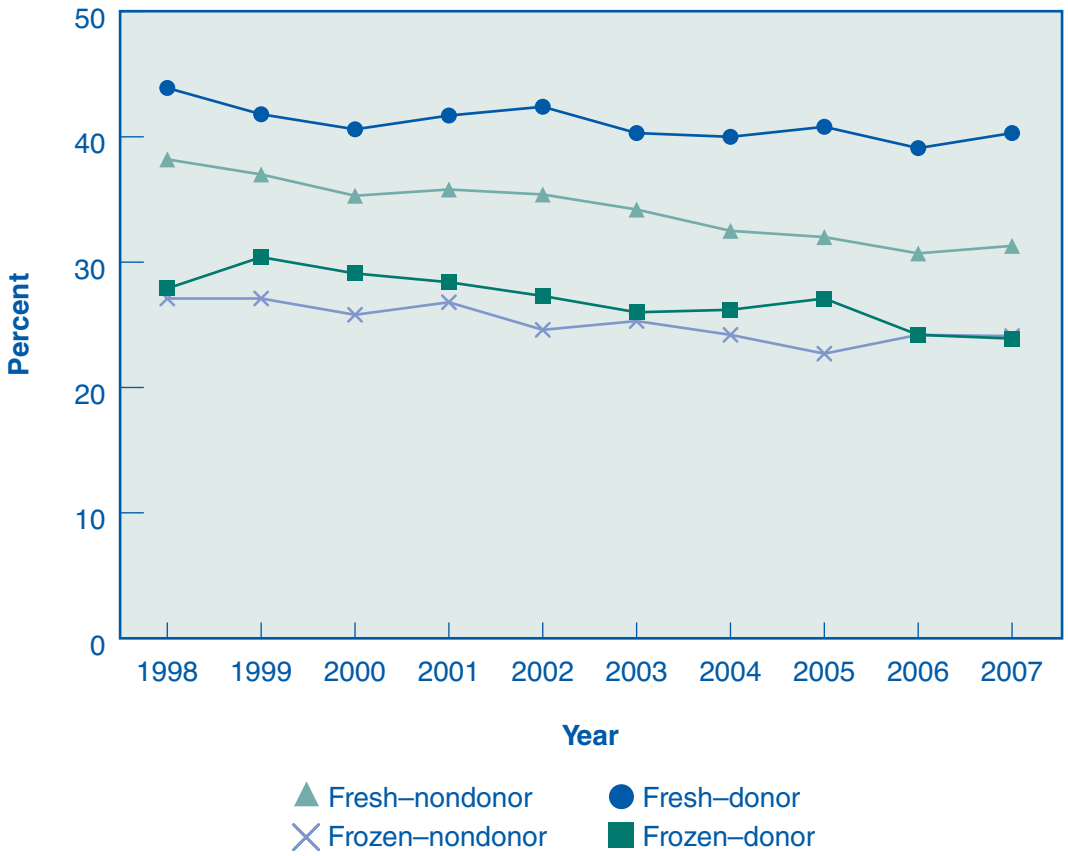
*Cycles involving the transfer of one embryo were not included because of the small number of cycles where one embryo was transferred and extra embryos were set aside for future use.

Have percentages of multiple-infant live births changed?

Multiple-infant births are associated with greater problems for both mothers and infants, including higher rates of caesarean section, prematurity, low birth weight, and infant disability or death. Figure 62 shows percentages of multiple-infant live births for the four primary types of ART procedures.

For fresh–nondonor cycles, the percentage of multiple-infant live births decreased 18% since 1998, from 38% of all live births in 1998 to 31% in 2007. Over the same period, the percentage of multiple-infant live births decreased 11% for frozen–nondonor cycles, 14% for frozen–donor cycles, and 8% for fresh–donor cycles.

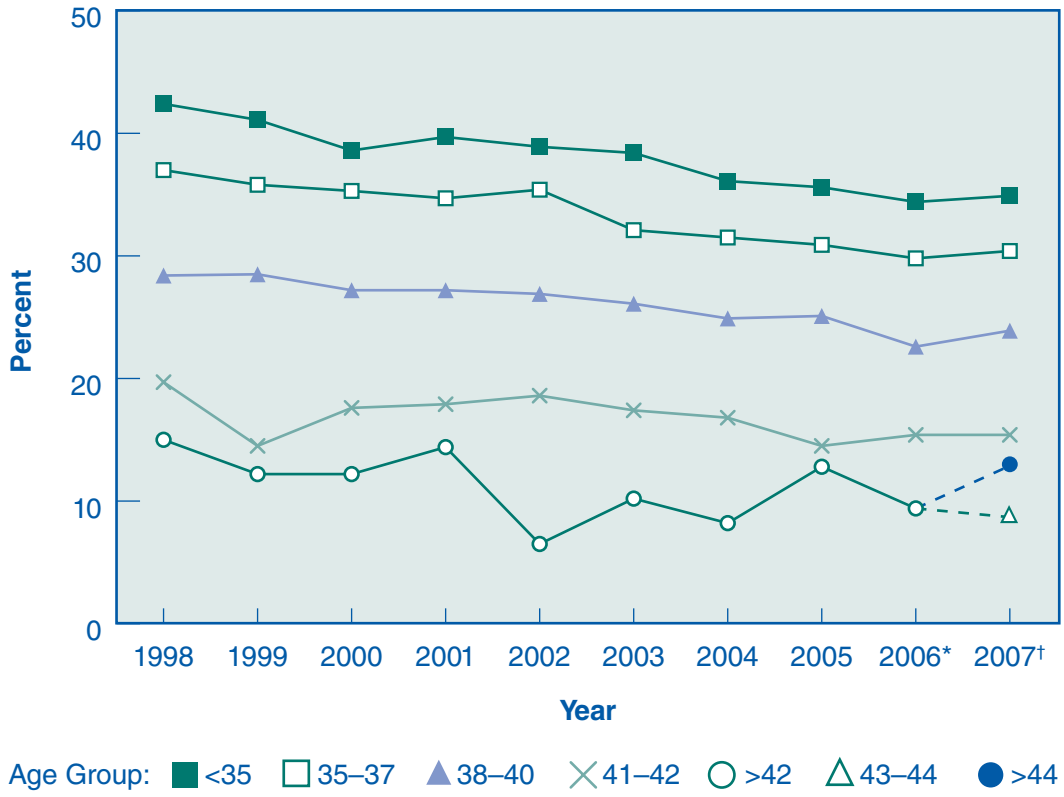
Figure 62
Percentages of Cycles That Resulted in Multiple-Infant Live Births, by Type of ART Cycle, 1998–2007



Have percentages of multiple-infant live births for ART cycles using fresh nondonor eggs or embryos changed in particular age groups?

Figure 63 shows that percentages of multiple-infant live births decreased between 1998 and 2007 for women in age groups younger than 35 through women 41–42. In 1998, 42% of live-birth deliveries to women younger than 35 were multiple-infant births, compared with 35% in 2007. Among women 41–42, the percentage of multiple-infant live births decreased from 20% in 1998 to 15% in 2007.

Figure 63
Percentages of Multiple-Infant Live Births for ART Cycles Using Fresh Nondonor Eggs or Embryos, by ART Patient's Age, 1998–2007



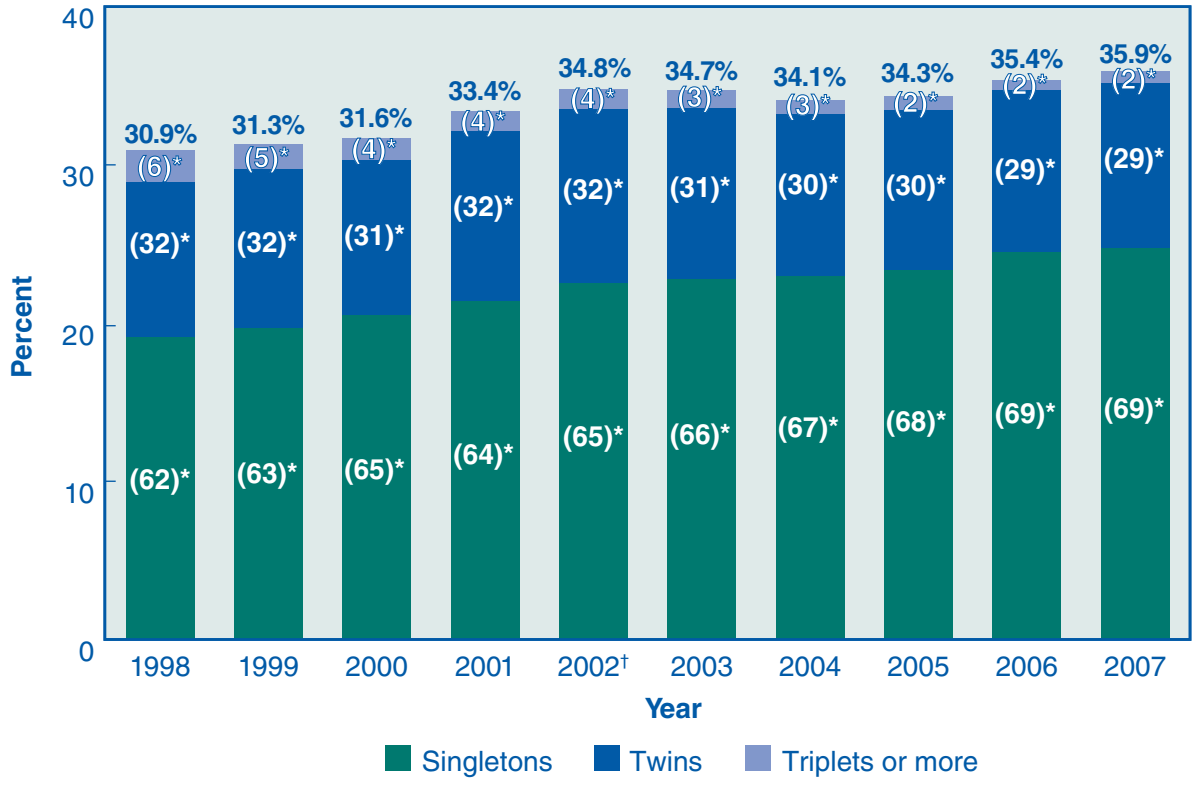
*2006 was the last year in which data were reported together for women older than 42.
†2007 was the first year in which data for women older than 42 were subdivided into ages 43–44 and >44.

Have percentages of singletons, twins, and triplets or more changed for ART cycles using fresh nondonor eggs or embryos?

Figure 64 presents the trends in percentages of transfers that resulted in live births and percentages of multiple-infant live births for ART cycles using fresh nondonor eggs or embryos. Overall, the percentage of transfers that resulted in live births increased from 31% in 1998 to 36% in 2007. From 1998 through 2007, the percentage of singleton live births increased from 62% to 69%; the percentage of twin births remained stable, ranging from 29% to 32%; and the percentage of triplet-or-more births decreased from 6% in 1998 to 2% in 2007.

It is important to note that twins, albeit to a lesser extent than triplets or more, are still at substantially greater risk for illness and death than singletons. These risks include low birth weight, preterm birth, and neurological impairments such as cerebral palsy. Both percentages of twin and triplet-or-more births remain significantly higher for ART births than for births resulting from natural conception.

Figure 64
Percentages of Transfers That Resulted in Live Births and Percentages of Multiple-Infant Live Births for ART Cycles Using Fresh Nondonor Eggs or Embryos, 1998–2007



*Percentages of live births that were singletons, twins, and triplets or more are in parentheses.
†Total does not equal 100% due to rounding.

2007

Fertility Clinic Tables

INTRODUCTION TO FERTILITY CLINIC TABLES

The first table in this section is the national summary of combined data from all clinics. Individual clinic tables follow, with each clinic's data presented in a one-page table that includes the types of ART used, patient diagnoses, success rates that each clinic reported and verified for 2007, and individual program characteristics. Clinics are listed in alphabetical order by state, city, and clinic name.

Many people considering ART will want to use this report to find the "best" clinic. However, comparisons between clinics must be made with caution. Many factors contribute to the success of an ART procedure. Some factors are related to the training and experience of the ART clinic and laboratory professionals and the quality of services they provide. Other factors are related to the patients themselves, such as their age and the cause of their infertility. Some clinics may be more willing than others to accept patients with low chances of success or may specialize in various ART treatments that attract particular types of patients. These and other factors to consider when interpreting clinic data are discussed below.

Important Factors to Consider When Using These Tables to Assess a Clinic

- ***These statistics are for 2007.*** Data for cycles started in 2007 could not be published until 2009 because the final outcomes of pregnancies conceived in December 2007 were not known until October 2008. Additional time was then required to collect and analyze the data and prepare the report. Many factors that contribute to a clinic's success rate may have changed in the 2 years since these procedures were performed. Personnel may be different. Equipment and training may or may not have been updated. As a result, success rates for 2007 may differ from current rates.

- ***No reported success rate is absolute.*** A clinic's success rates vary from year to year even if all determining factors remain the same. The more cycles that a clinic carries out, the less the rate is likely to vary. Conversely, clinics that perform fewer cycles are likely to have more variability in success rates from year to year. As an extreme example, if a clinic reports only one ART cycle in a given category, as is sometimes the case in the data presented here, the clinic's success rate in that category would be either 0% or 100%. For further detail, see the explanation of confidence intervals on pages 525–526.

- ***Some clinics see more than the average number of patients with difficult infertility problems.*** Some clinics are willing to offer ART to most potential users, even those who have a low probability of success. Others discourage such patients or encourage them to use donor eggs, practices that result in higher success rates among older women. Clinics that accept a higher percentage of women who previously have had multiple unsuccessful ART cycles will generally have lower success rates. In contrast, clinics that offer ART procedures to patients who might have become pregnant with less technologically advanced treatment will have higher success rates.

A related issue is that success rates shown in this report are presented in terms of cycles, as required by law, rather than in terms of women. As a result, women who had more than one ART cycle in 2007 are represented in multiple cycles that cannot be linked. If a woman who underwent several ART cycles at a given clinic either never had a successful cycle or had a successful cycle only after numerous attempts, the clinic's success rates would be lowered.

- ***Cancellation percentages affect a clinic's success rate.*** Percentages of cancelled cycles using fresh nondonor eggs or embryos vary among clinics from less than 1% to, in a few cases, more than 30%. A high percentage of cancellations tends to lower the percentage of cycles resulting in live births but may increase the percentage of retrievals resulting in live births and the percentage of transfers resulting in live births.

- ***Percentages of unstimulated (or "natural") cycles are included with those for stimulated cycles.*** In an unstimulated cycle, the woman ovulates naturally rather than through the daily injections used in stimulated cycles. Unstimulated cycles are less expensive because they require no daily injections and fewer ultrasounds and blood tests. However, women who use natural or mild stimulation produce only one or two follicles, thus reducing the potential number of embryos for transfer. As a result, unstimulated cycles are less successful, and clinics that perform a relatively high percentage of unstimulated cycles will have lower success rates. Nationally, fewer than 1% of ART cycles using fresh nondonor eggs or embryos in 2007 were unstimulated. In a very few clinics, more than 2% of cycles were unstimulated.

- ***Success rates are calculated per cycle rather than per patient.*** Therefore, for patients who undergo both fresh and frozen cycles, success rates are calculated separately for each cycle. Clinics that have a very high percentage of cycles resulting in live births with frozen embryos would have higher ART success rates if these births were included as successes from the original stimulated cycle. Consumers should look at both rates (for cycles using fresh embryos and for those using frozen embryos) when assessing a clinic's success rates.

- ***The number of embryos transferred varies from clinic to clinic.*** In 2007, the average number of embryos that a clinic transferred to women younger than age 35 ranged from one to four for fresh–nondonor cycles. The American Society for Reproductive Medicine and the Society for Assisted Reproductive Technology discourage the transfer of a large number of embryos because it increases the likelihood of multiple gestations. Multiple gestations, in turn, increase both the probability of premature birth and its related problems and the need for multifetal pregnancy reductions.

In addition, success rates can be affected by many other factors, including

- Quality of eggs.
- Quality of sperm (including motility and ability to penetrate the egg).
- Skill and competence of the treatment team.
- General health of the woman.
- Genetic factors.

We encourage consumers considering ART to contact clinics to discuss their specific medical situations and their potential for success using ART. Because clinics did not have the opportunity to provide narratives to explain their data, such conversations could provide additional information to help people decide whether to use ART.

Although ART offers important options for the treatment of infertility, the decision to use ART involves many factors in addition to success rates. Undergoing repeated ART cycles requires substantial commitments of time, effort, money, and emotional energy. Therefore, consumers should carefully examine all related financial, psychological, and medical issues before beginning treatment. They also will want to consider the location of the clinic, the counseling and support services available, and the rapport that staff members have with their patients.

An explanation of how to read a fertility clinic table begins on page 85.

SAMPLE CLINIC TABLE

A comparison of clinic success rates may not be meaningful because patient medical characteristics and treatment approaches vary from clinic to clinic. For more details about this, along with information on how to interpret the statistics in this table, see pages 81–90.

2007 ART CYCLE PROFILE

1 Type of ART[a]

IVF	>99%	**Procedural Factors:**	
GIFT	<1%	With ICSI	53%
ZIFT	<1%	Unstimulated	<1%
Combination	<1%	Used gestational carrier	<1%
		Used PGD	5%

2 Patient Diagnosis

Tubal factor	13%	Other factor	7%
Ovulatory dysfunction	6%	Unknown factor	10%
Diminished ovarian reserve	9%	*Multiple Factors:*	
Endometriosis	6%	Female factors only	13%
Uterine factor	1%	Female & male factors	18%
Male factor	17%		

4 2007 PREGNANCY SUCCESS RATES

3 Data verified by X. Y. Zee, MD

Type of Cycle	5 Age of Woman <35	35–37	38–40	41–42	43–44[d]
4A Fresh Embryos from Nondonor Eggs					
Number of cycles	115	106	68	19	12
Percentage of cycles resulting in pregnancies[b]	45.2	37.7	23.5	5 / 19	3 / 12
Percentage of cycles resulting in live births[b,c]	37.4	31.1	20.6	2 / 19	1 / 12
6 (Confidence Interval)	(28.5–46.2)	(22.3–39.9)	(11.0–30.2)		
Percentage of retrievals resulting in live births[b,c]	42.6	33.3	23.7	2 / 17	1 / 10
Percentage of transfers resulting in live births[b,c]	52.4	34.7	24.1	2 / 15	1 / 7
Percentage of transfers resulting in singleton live births[b]	29.3	29.5	19.0	2 / 15	0 / 7
Percentage of cancellations[b]	12.2	6.6	13.2	2 / 19	2 / 12
Average number of embryos transferred	2.0	2.5	3.8	2.9	2.7
Percentage of pregnancies with twins[b]	38.5	12.5	4 / 16	1 / 5	1 / 3
Percentage of pregnancies with triplets or more[b]	3.8	2.5	1 / 16	0 / 5	0 / 3
Percentage of live births having multiple infants[b,c]	44.2	15.2	3 / 14	0 / 2	1 / 1
4B Frozen Embryos from Nondonor Eggs					
Number of transfers	62	25	20	14	8
Percentage of transfers resulting in live births[b,c]	27.4	24.0	20.0	2 / 14	1 / 8
Average number of embryos transferred	2.1	2.0	2.7	3.1	2.9

	All Ages Combined[e]	
4C Donor Eggs	**Fresh Embryos**	**Frozen Embryos**
Number of transfers	49	14
Percentage of transfers resulting in live births[b,c]	51.0	4 / 14
Average number of embryos transferred	2.1	3.4

7 CURRENT CLINIC SERVICES AND PROFILE

Current Name: ART Clinic of the United States

Donor egg?	Yes	Gestational carriers?	Yes	SART member?	Yes
Donor embryo?	Yes	Cryopreservation?	Yes	Verified lab accreditation?	Yes
Single women?	No			*(See Appendix C for details.)*	

[a] Reflects patient and treatment characteristics of ART cycles performed in 2007 using fresh nondonor eggs or embryos.
[b] When fewer than 20 cycles are reported in an age category, rates are shown as a fraction and confidence intervals are not given. Calculating percentages from fractions may be misleading and is not encouraged.
[c] A multiple-infant birth is counted as one live birth.
[d] Clinic-specific outcome rates are unreliable for women older than 44 undergoing ART cycles using fresh or frozen embryos with nondonor eggs. Readers are urged to review national outcomes for these age groups (see page 29).
[e] All ages (including ages >44) are reported together because previous data show that patient age does not materially affect success with donor eggs.

How to Read a Fertility Clinic Table

This section is provided to help consumers understand the information presented in the fertility clinic tables. The number before each heading refers to the number of the corresponding section in the sample clinic table on the opposite page. Technical terms are defined in the Glossary of Terms (Appendix B).

1. Type of ART used

This section gives the breakdown of ART cycle types that each clinic performed using fresh nondonor eggs or embryos (IVF, GIFT, ZIFT, or combinations thereof). It also lists the percentage of procedures that involved intracytoplasmic sperm injection (ICSI); the percentage of cycles that were unstimulated; the percentage of cycles that used a gestational carrier; and the percentage of cycles that used preimplantation genetic diagnosis (PGD), which was not performed by all clinics in 2007. (See Glossary of Terms in Appendix B for definitions of IVF, GIFT, ZIFT, ICSI, unstimulated cycle, gestational carrier and PGD.)

2. ART patient diagnosis

Consumers may want to know what percentage of a particular clinic's patients have the same diagnosis as they do. (See Glossary of Terms in Appendix B for definitions of diagnoses.) In addition, patients' diagnoses may affect a clinic's success rates. However, the use of these diagnostic categories may vary somewhat from clinic to clinic.

3. Verification

To have success rates published in the annual report, a clinic's medical director must verify the accuracy of the tabulated success rates. The name of the individual who verified the clinic's data is shown.

4. Success rates by type of cycle

Success rates are given for the three categories of cycles described in 4A–C below: cycles using fresh embryos from nondonor eggs, cycles using frozen embryos from nondonor eggs, and cycles using donor eggs. The ART success rates shown were calculated based on data from all ART cycle types (IVF, both with and without ICSI; GIFT; and ZIFT). Data from these procedures were combined because there was little difference in success rates when we examined each type of ART procedure separately.

The success rates indicate the average chance of success for the given procedure at the clinic in 2007 for each of five age groups. Success rates are calculated as the percentage of cycles started, egg retrievals, or embryo transfers that resulted in either pregnancies or live births at the ART clinic in 2007. For example, if a clinic started a total of 50 cycles in 2007 and these resulted in 15 live births, the average success rate for cycles started at that clinic would be

15 (births) ÷ 50 (cycles) = 0.3 or 30%.

Thus, the success rate at that clinic in 2007 was 30%, meaning that 30% of cycles started that year resulted in a live birth.

Success rate calculations are very unstable if they are based on a small number of cycles. Therefore, when fewer than 20 cycles are reported in a given category, the rates are shown as fractions rather than percentages. For example, the sample clinic performed only 19 fresh embryo cycles using

nondonor eggs among women aged 41–42 years. Of these 19 cycles, 2—or 10%—were successful. However, because of the small number of cycles, 10% is not a statistically reliable success rate, so the success rate is presented as 2 / 19, meaning 2 out of 19.

4A. Cycles using fresh embryos from nondonor eggs

This section includes IVF, ICSI, GIFT, and ZIFT cycles that used a woman's own eggs. Cycles that used frozen embryos or donor eggs or embryos are not included here.

- **Percentage of cycles resulting in pregnancies**

  (Number of pregnancies divided by number of cycles started, expressed as a percentage of cycles)

  A stimulated cycle is started when a woman begins taking fertility drugs; an unstimulated cycle is started when egg production begins being monitored. The number of cycles that a clinic starts is not the same as the number of patients that it treats because some women start more than one cycle in a year. Because some pregnancies end in a miscarriage, induced abortion, or stillbirth, the percentage of cycles resulting in pregnancies is usually higher than the percentage of cycles resulting in live births.

- **Percentage of cycles resulting in live births**

  (Number of live births divided by number of cycles started, expressed as a percentage of cycles)

  This number represents the cycles that resulted in a live birth out of all ART cycles started. One live birth may include one or more children born alive; that is, a multiple-infant birth (e.g., twins, triplets) is counted as one live birth.

- **Percentage of retrievals resulting in live births**

  (Number of live births divided by number of egg retrieval procedures, expressed as a percentage of retrievals)

  This number represents the cycles that resulted in a live birth out of all cycles in which an egg retrieval was performed. The number of egg retrievals a clinic performs often is smaller than the number of cycles started because some cycles are canceled before the woman has an egg retrieved. As a result, the percentage of retrievals resulting in live births is usually higher than the percentage of cycles resulting in live births. Cycles are canceled for many reasons: eggs may not develop, the patient may become ill, or the patient may choose to stop treatment (see Figure 6, page 20).

- **Percentage of transfers resulting in live births**

  (Number of live births divided by number of embryo transfer procedures, expressed as a percentage of transfers)

  This number represents the cycles that resulted in a live birth out of all cycles in which one or more embryos were transferred into the woman's uterus or, in the case of GIFT and ZIFT, egg and sperm or embryos were transferred into the woman's fallopian tubes. A clinic may perform more egg retrievals than embryo transfers because not every retrieval results in egg fertilization and embryo transfer. For this reason, the percentage of transfers resulting in live births generally will be higher than those reported for egg retrievals and for cycles started.

- **Percentage of transfers resulting in singleton live births**

  (Number of singleton live births divided by number of embryo transfer procedures, expressed as a percentage of transfers)

  This number represents the cycles that resulted in the birth of a single infant out of all cycles in which one or more embryos were transferred into the woman's uterus or, in the case of GIFT and ZIFT, egg and sperm or embryos were transferred into the woman's fallopian tubes. Singleton births have a much lower risk than multiple-infant births for adverse infant health outcomes, including prematurity, low birth weight, disability, and death.

- **Percentage of cancellations**

  (Number of cycles canceled divided by the total number of cycles, expressed as a percentage of cycles)

  This number refers to the cycles that were stopped before an egg was retrieved. A cycle may be canceled if a woman's ovaries do not respond to fertility medications and thus do not produce a sufficient number of follicles. Cycles also may be canceled because of illness or other medical or personal reasons.

- **Average number of embryos transferred**

  (Average number of embryos per embryo transfer procedure)

  The average number of embryos transferred varies from clinic to clinic. The American Society for Reproductive Medicine (ASRM) and the Society for Assisted Reproductive Technology (SART) have practice guidelines that address this issue.

- **Percentage of pregnancies with twins**

  (Number of pregnancies with two fetuses divided by the total number of pregnancies, expressed as a percentage of pregnancies)

  A pregnancy with two fetuses is counted as one pregnancy.

- **Percentage of pregnancies with triplets or more**

  (Number of pregnancies with three or more fetuses divided by the total number of pregnancies, expressed as a percentage of pregnancies)

  Pregnancies with multiple fetuses can be associated with increased risk for mothers and infants (e.g., higher rates of caesarean section, prematurity, low birth weight, infant death) and the possibility of multifetal pregnancy reduction.

  A pregnancy with three or more fetuses is counted as one pregnancy.

- **Percentage of live births having multiple infants**

  (Number of deliveries resulting in a birth of more than one infant divided by the number of live births, expressed as a percentage of live births)

  A delivery of one or more live-born infants is counted as one live birth.

4B. Cycles using frozen embryos from nondonor eggs

Frozen (cryopreserved) embryo cycles are those in which previously frozen embryos are thawed and then transferred. Because frozen embryo cycles use embryos formed from a previous stimulated cycle, no stimulation or retrieval is involved. As a result, these cycles usually are less expensive and less invasive than cycles using fresh embryos. In addition, freezing some of the embryos from a retrieval procedure may increase a woman's overall chances of having a child from a single retrieval.

4C. Cycles using donor eggs

Success rates are presented separately for cycles using fresh donor eggs or embryos and those using frozen donor embryos. Older women, women with premature ovarian failure (early menopause), women whose ovaries have been removed, and women with a genetic concern about using their own eggs may consider using eggs that are donated by a young, healthy woman. Embryos donated by couples who previously had ART also may be available. Many clinics provide services for donor egg and embryo cycles. For these cycle types, results from women in all age groups (including older than 44) are reported together because previous data show that patient age does not affect success rates with donor eggs (see Figures 45 and 46 on pages 59 and 60).

5. Age of woman

Because a woman's fertility declines with age, clinics report lower success rates for older women attempting to become pregnant with their own eggs. For this reason, rates for women using nondonor eggs or embryos are reported separately for women younger than age 35, for women 35–37, for women 38–40, for women 41–42, and for women 43–44. Clinic-specific outcome rates are not shown for women older than 44 who undergo ART using their own eggs because the number of women in this age group at each clinic is small; therefore, a calculation of the percentage of cycles resulting in live births in older age groups may not be meaningful. Readers are encouraged to review national outcomes for these age groups shown in Figure 15 on page 29. The sample clinic table illustrates the decline in ART success rates among older women. For example, for cycles that used fresh embryos from nondonor eggs, the percentage of cycles resulting in live births among women younger than 35 was 37.4%, whereas the percentage of cycles resulting in live births among women aged 38–40 was 20.6%.

6. Confidence interval

The tables show a range, called the **95% confidence interval,** that conveys the reliability of a clinic's demonstrated success rate. This range is calculated only if 20 or more cycles are reported in an age category. (When fewer than 20 cycles are reported in a given category, success rates are shown as fractions rather than percentages; see paragraph 4, Success rates by type of cycle, page 85.) In general, the more cycles that a clinic performs, the narrower the range. A narrow range means we are more confident that a clinic would have a similar success rate if it treated other similar groups of patients under similar clinical conditions. On the other hand, a wide range tells us that a clinic's success rate is more likely to vary under similar circumstances because we had less information (fewer cycles) on which to base our estimates. Even though one clinic's success rate may appear higher than another's based on the confidence intervals, ***these confidence intervals are only one indication that the success rate may be better. Other factors also must be considered*** when comparing rates from two clinics. For example, some clinics see more than the average number of patients with difficult

infertility problems, whereas others discourage patients with a low probability of success. For further information on important factors to consider when using the tables to assess a clinic, refer to pages 81–83.

For a more detailed explanation and examples of confidence intervals, see pages 525–526 in Appendix A.

7. Clinic services and profile

- **Current name.** This name reflects name changes that may have occurred since 2007, whereas the clinic name at the top of the table was the name of the ART clinic as it existed in 2007. Some clinics not only have changed their names but have reorganized as well. Reorganization is defined as a change in ownership or affiliation or a change in at least two of the three key staff positions (practice director, medical director, or laboratory director). In such cases, no current name will be listed, but a statement will be included that the clinic has undergone reorganization since 2007. Also, in such cases, no current clinic services or profile will be listed.
- **Donor egg program.** Some clinics have programs for ART using donor eggs. Donor eggs are eggs that have been retrieved from one woman (the donor) and then transferred to another woman who is unable to conceive with her own eggs (the recipient). Policies regarding sharing of donor eggs vary from clinic to clinic.
- **Donor embryo.** These are embryos that were donated by another couple who previously underwent ART treatment and had extra embryos available.
- **Single women.** Clinics have varying policies regarding ART services for single (unmarried) women.
- **Gestational carriers.** A gestational carrier is a woman who carries a child for another woman; sometimes such women are referred to as gestational surrogates. Policies regarding ART services using gestational carriers vary from clinic to clinic. Some states do not permit clinics to offer this service.
- **Cryopreservation.** This item refers to whether the clinic has a program for freezing extra embryos that may be available from a couple's ART cycle.
- **SART member.** In 2007, 380 of the 430 reporting clinics were Society for Assisted Reproductive Technology (SART) members.
- **Verified lab accreditation.** If "yes" appears next to this item, the ART clinic uses an embryo laboratory accredited by one of the following organizations:
  - College of American Pathologists (CAP)/American Society for Reproductive Medicine (ASRM), Reproductive Laboratory Accreditation Program.
  - Joint Commission on Accreditation of Healthcare Organizations (JCAHO).
  - New York State Tissue Bank Program (NYSTB).

If "pending" appears here, it means that the clinic has submitted an application for accreditation to one of the above organizations and has provided proof of such application to Westat. "No" indicates that the embryo laboratory has not been accredited by any of these three organizations.

CDC provides this information as a public service. ***Please note that CDC does not oversee any of these accreditation programs.*** They are all nonfederal programs. To become certified, laboratories must have in place systems and processes that comply with the accrediting organization's standards. Depending on the organization, standards may include those for personnel, quality control and quality assurance, specimen tracking, results reporting, and the performance of technical procedures. Compliance with these standards is confirmed by documentation provided by the laboratory and by on-site inspections. For further information, consumers may contact the following accrediting organizations directly:

- CAP/ASRM, Reproductive Laboratory Accreditation Program: For a list of accredited laboratories, call 800-323-4040 and ask for Laboratory Accreditation.
- JCAHO: Call 630-792-5800 to inquire about the status of individual laboratories.
- New York State: Call 518-485-5341 to find out which laboratories are certified under the tissue bank regulations.

Further information on laboratory accreditation is provided in Appendix C.

2007 NATIONAL SUMMARY

A comparison of clinic success rates may not be meaningful because patient medical characteristics and treatment approaches vary from clinic to clinic. For more details about this, along with information on how to interpret the statistics in this table, see pages 81–90.

2007 ART CYCLE PROFILE

Type of ART[a]

IVF	>99%
GIFT	<1%
ZIFT	<1%
Combination	<1%

Procedural Factors:

With ICSI	63%
Unstimulated	<1%
Used gestational carrier	<1%
Used PGD	5%

Patient Diagnosis

Tubal factor	8%
Ovulatory dysfunction	7%
Diminished ovarian reserve	13%
Endometriosis	4%
Uterine factor	1%
Male factor	17%
Other factor	8%
Unknown factor	11%
Multiple Factors:	
Female factors only	12%
Female & male factors	18%

2007 PREGNANCY SUCCESS RATES

Type of Cycle

Age of Woman

	<35	35–37	38–40	41–42	43–44[c]
Fresh Embryos from Nondonor Eggs					
Number of cycles	42,127	23,504	20,612	9,535	4,814
Percentage of cycles resulting in pregnancies	45.7	37.2	28.1	18.4	10.2
Percentage of cycles resulting in live births[b]	39.6	30.5	20.9	11.5	5.4
Percentage of retrievals resulting in live births[b]	42.9	34.2	24.4	14.0	6.7
Percentage of transfers resulting in live births[b]	45.9	36.9	27.1	16.0	8.4
Percentage of transfers resulting in singleton live births[b]	29.9	25.7	20.6	13.6	7.7
Percentage of cancellations	7.6	10.8	14.1	17.8	19.6
Average number of embryos transferred	2.2	2.5	2.8	3.1	3.2
Percentage of pregnancies with twins	33.2	28.2	21.6	14.0	10.6
Percentage of pregnancies with triplets or more	3.5	4.5	4.0	2.5	0.8
Percentage of live births having multiple infants[b]	34.9	30.4	23.9	15.4	8.9
Frozen Embryos from Nondonor Eggs					
Number of transfers	10,518	5,388	3,518	1,126	448
Percentage of transfers resulting in live births[b]	33.6	29.9	25.0	20.9	14.7
Average number of embryos transferred	2.2	2.2	2.4	2.5	2.4

All Ages Combined[d]

Donor Eggs	Fresh Embryos	Frozen Embryos
Number of transfers	10,321	5,633
Percentage of transfers resulting in live births[b]	55.1	31.9
Average number of embryos transferred	2.2	2.3

CURRENT CLINIC SERVICES AND PROFILE

Total number of reporting clinics: 430

Percentage of clinics that offer the following services:

Donor egg	93
Donor embryo	67
Single women	91
Gestational carriers	82
Cryopreservation	99

Clinic profile:

SART member	88
Verified lab accreditation	
Yes	91
No	3
Pending	6

[a] Reflects patient and treatment characteristics of ART cycles performed in 2007 using fresh nondonor eggs or embryos.
[b] A multiple-infant birth is counted as one live birth.
[c] See page 29 for national summary statistics for women older than 44.
[d] All ages (including ages >44) are reported together because previous data show that patient age does not materially affect success with donor eggs.